THE MARINE REVIEW

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EXPRESS BOATS ON LAKE MINNETONKA

WHEN the Twin City Rapid Transit Co., operating the street car system in Minneapolis and St. Paul, Minn., built its suburban line to Lake Minnetonka, which lies about 18 miles west of Minneapolis, it was decided that a connecting system of boats on the lake was necessary to supplement the suburban electric railroad. In fact, without the boats it became apparent that the electric line could not realize its fullest possibilities in competition with existing steam railroads.

For the boat service a fleet of six express steamers and three excursion steamers was, therefore, acquired by construction and purchase. The six express boats, which are virtually duplicates, were built new and are of an entirely new type, designed to give maximum carrying capacity and comfort, combined with reasonable speed and economy of operation.

A light draught model with torpedo stern was adopted chiefly because of local considerations. Lake Minnetonka is comparatively shallow, weedy in spots and with many narrow, tortuous passages between its islands. The dimensions of the hull are as follows:

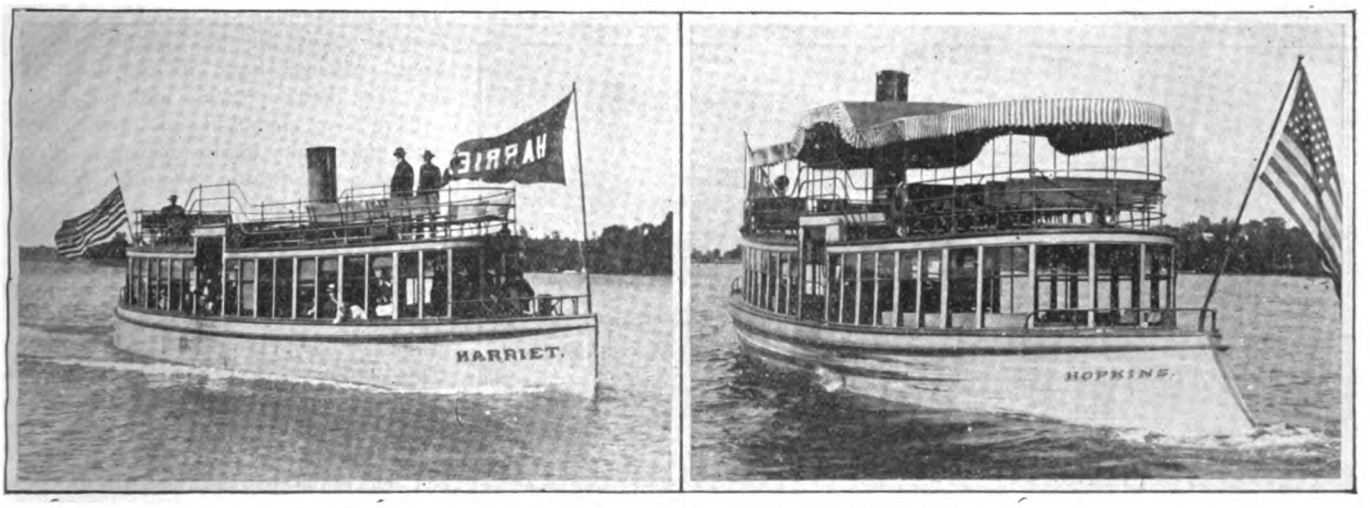
Length over all, 71 ft.; beam, 14 ft.; depth of hold, 6 ft. 8 in.; draught, without passengers, 3 ft.; length of cabin, 49 ft. 6 in.; headroom in cabin, 6 ft. 8¾ in.

The engine and boiler are placed amidship and secured to long keelsons. The boiler is of the Roberts safety water tube type with 700 sq. ft. of heating surface and built for a working pressure of 260 lbs. Bituminous coal is used for fuel, the daily consumption of which is about 1¼ tons. The coal is carried in side bunkers alongside of the boiler.

A triple-expansion condensing engine with cylinders 5½, 9 and 15 in. diameter by 7 in. stroke drives a 44-in. propeller with 72 in. pitch at 260 r. p. m. At this speed and with 260 lbs. boiler pressure, the engine develops 150 i. h. p. A Blake jet condenser is installed.

The normal speed of the boat is about 11 miles per hour.

It is in the cabin design and passenger accommodations that these boats depart most radically from the usual type of small steamer. The best ideas in modern car construction have been successfully grafted onto marine requirements, resulting in a very comfortable and roomy craft. The interior of the main cabin is strikingly similar to that of the modern 46-ft. electric cars, operated by the Twin City Rapid Transit Co. The



THE PASSENGER STEAMERS HARRIET AND HOPKINS ON LAKE MINNETONKA.

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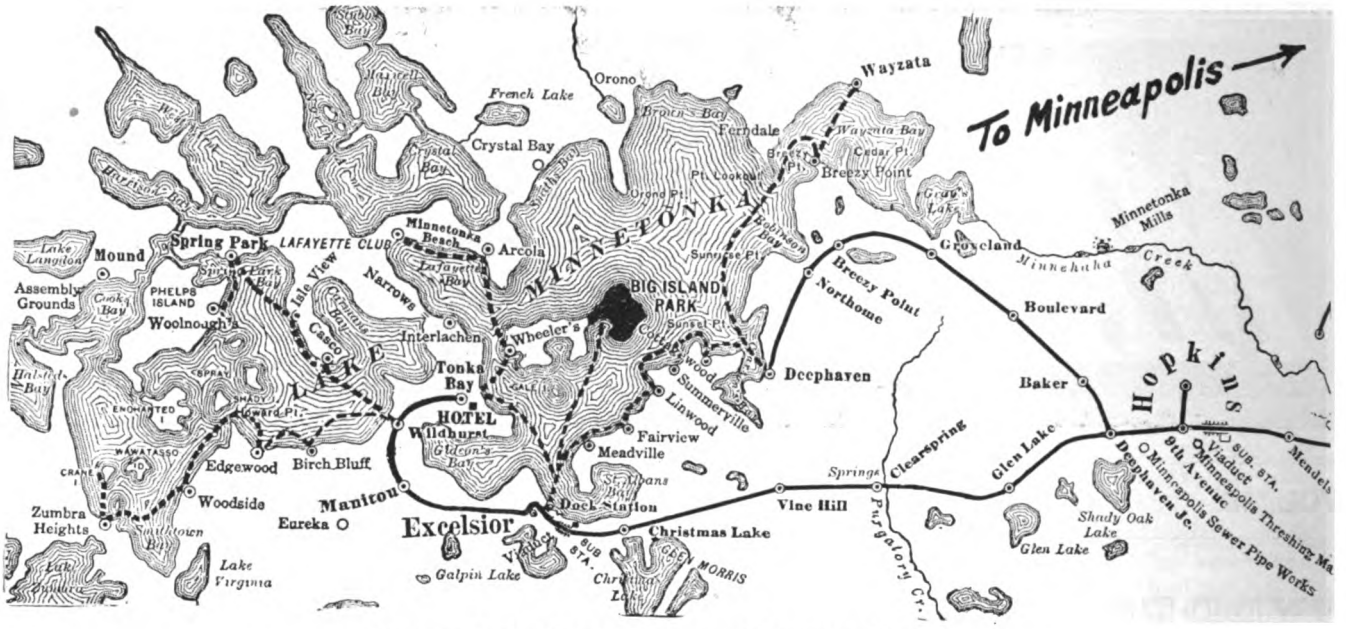
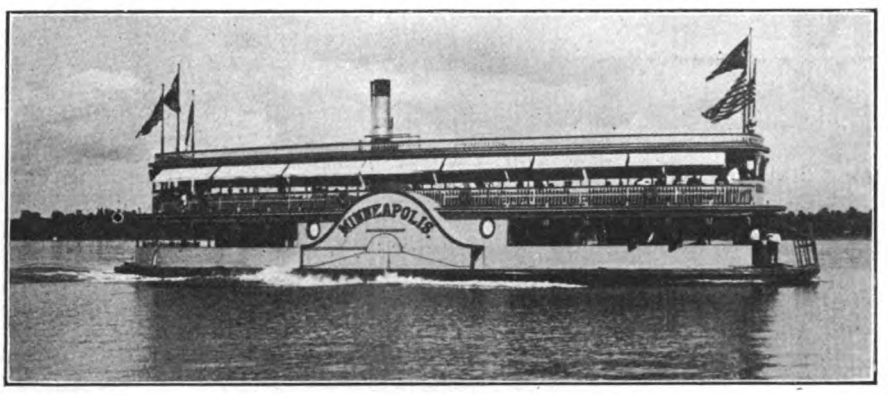


MAP OF LAKE MINNETONKA AND TRIBUTARY WATERS.

cabin is 49½ ft. in length, 12 ft. in width and is fitted up with rattan car seats. The sides are practically all glass and are fitted with car type windows dropping under the sash. Passengers embark and disembark through gangways amidships on each side.

As shown in the illustrations, additional seating capacity is provided on the upper deck and covered by an awning. This adds appreciably to the passenger accommodations and in pleasant weather the upper deck is much more popular than the glass enclosed cabin below. A stairway leads from the cabin to the upper deck. Seats are provided for 120 persons and the maximum passenger allowance is 175.



FERRY STEAMER MINNEAPOLIS ON LAKE MINNETONKA.

The pilot steers from a hand wheel located in a railed off space at the forward end of the main cabin. The two other members of the crew are an engineer, who also does duty as fireman, and a purser who collects fares and handles lines when landing. The number of fares taken is recorded on a standard car register.

The six express boats are operated between May 15 and Oct. 15 each year on three different routes which effectually cover all points on the lake. The routes center at Excelsior, Wildhurst and Deephaven, where connections are made with the electric car line. The schedules are arranged to make close connections with fast express cars both to and from Minneapolis and hourly service is given to all points on the boat routes between 6:00 a. m. and 8:00 p. m. The express boats handle only passengers and a limited amount of baggage.

In addition to the express boats, the company operates ferries between Excelsior and Big Island park. These boats are of the usual paddle wheel double-ended type, as shown in the photo.

The express boats have proven economical and satisfactory in operation. Although, as outlined above, they possess some unusual features in general design and in cabin arrangements smack much more of the rail than of the water, they are being copied for other inland lake service as far west as Lake Coeur d'Alene, Idaho. The Twin City boat lines are under the supervision of L. S. Cairns, general superintendent.

New Pacific Coast Steamers

With the advent of the Grand Trunk Pacific Steamship Co. into Puget Sound waters, events in the Canadian Pacific coast passenger trade are moving rapidly. The Prince Rupert and the Prince Albert have already inaugurated a new and important service between Puget Sound ports, Seattle, Victoria, Vancouver, Prince Rupert and Stewart, and by the time this issue of THE MARINE REVIEW is out, the Prince George will also have begun service on her schedule to and from British Columbia ports.

The Grand Trunk Pacific is building new docks in Seattle and at Victoria, which provide for ample warehouse and shipping facilities.

On June 12, the Prince Rupert started on her initial trip to Stewart, touching Victoria, Vancouver and Prince Rupert on her way. Prince Rupert will be the western terminus of the Grand Trunk Pacific, when completed in 1912. Prince Rupert has an estimated population of 3,000 to 4,000 and is situated on Kaien Island, 550 miles north of Vancouver. Though newly opened, it occupies a strategical position as a Pacific coast port, having an ideal harbor and being a port of call for most ocean going vessels as well as those plying between Seattle and the various points in Alaska.

The Dominion Government Hydrographic survey of Prince Rupert harbor and approaches shows that the entire harbor from the entrance to the ex-

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STEAMER PRINCE RUPERT.

treme end of the upper harbor, a distance of 14 miles, is entirely free from rocks or obstructions of any kind with a sufficient depth to afford good anchorage. The entrance to the harbor is perfectly straight, 2,000 ft. in width at the narrowest part, with a minimum depth of 36 ft. at low tide and for a width of 1,500 ft., a minimum depth of 60 ft. The harbor has three outlets so that there are no strong tidal currents.

Stewart, the farthest north point of call of the G. T. P. steamship, lies 120 miles north of Prince Rupert, the town being located at the extreme head of the Portland Canal, about a mile and a half north of the boundary line between British Columbia and Alaska. It is the newest mining town and headquarters for the newest mining field.

The Prince Rupert and Prince George are twin passenger steamers, built especially for the service they are taking up on the Pacific coast and were described in February MARINE REVIEW.

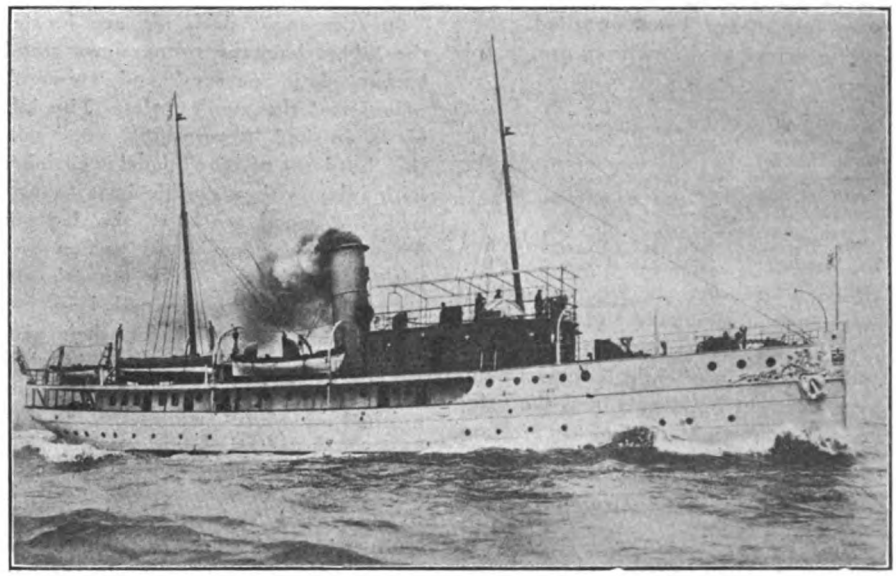
The cabin plans of both steamers, which are presented herewith, give a clear idea of the arrangement of accommodations. The Prince Rupert is commanded by Capt. B. S. Johnson and the Prince George by Capt. Geo. Robertson.

The Prince Albert, the first of the steamers of the Grand Trunk Pacific Co., is a package freighter with a limited amount of first-class passenger accommodation. She is on the run from Seattle to Prince Rupert, Portland Canal and Vancouver Island. Prince Albert was purchased from the Wilson line, of Hull, and was built in 1892 as the Bruno. Prince Albert is a steel screw steamer of 841 tons gross, 424 tons net, 232 ft. long, 30 ft. beam and 14.1 ft. deep, and is commanded by Capt. Waymouth, formerly in command of the steamer Henriette.

Survey Steamer Cartier

MESSRS. Swan, Hunter & Wigham Richardson, Ltd., of Newcastle-on-Tyne, have just completed the twin-screw survey steamer Cartier to the order of the Canadian government. The principal dimensions of the Cartier are, length, 173 ft. 6 in.; breadth, 29 ft. 1½ in.; depth molded to upper deck 15 ft.; gross tonnage, 555.7 tons, net tonnage, 234 tons; dead weight capacity, 230 tons on 11 ft.; displacement, 1,035 tons, draught 12 ft. 8 in.; and service speed on trial 11 knots. The new vessel was designed by R. L. Newman, of Victoria, B. C., and derives her name from the French Canadian explorer. It is intended with her to complete the hydrographic survey of the east coast of Canada, the first work undertaken being the survey of the St. Lawrence river, where she will replace the present steamer La Canadienne. Prior to the work of survey being taken up by the latter vessel it was carried out by the Imperial government, but some few years ago the Dominion government took it in hand, and have since built two vessels for the work, of which the Cartier is the second. The first vessel, the Lillooet, was built last year in British Columba, and continued the survey work hitherto performed by H. M. S. Egeria on the Canadian west coast.

The Cartier has a large number of watertight compartments in order to insure the safety of the vessel when in unchartered waters. In shallow waters the staff of the Cartier will leave the steamer, and conduct surveys in launches and boats, afterwards returning to the vessel to work up their observations. Accordingly they are provided with two gasoline launches, each 27 ft. by 6 ft. 9 in. by 3 ft., as also two gigs 27 ft. by 6 ft. by 2 ft. 5 in. and one dinghy, 18 ft. by 5 ft. 4 in., by 2 ft. 2 in. The launches are of the single-screw type with motors of the two-cylinder "standard" pattern, 15 brakehorsepower. They are carvel built, the planking is of English oak with mahogany topsides and mahogany deck all round the sides and at the ends. They are each fitted with copper buoyancy tanks, mast and sail, and a complete Board of Trade outfit. The Cartier is also provided with an electric searchlight on the bridge and a Lucas sounding machine.



STEAMER CARTIER.

The Grand Trunk Pacific Railway Co. has applied to the government for a second-class subsidy for the construction of a dry dock at Prince Rupert, B. C., with a lifting capacity of 20,000 tons. It is proposed to spend $1,500,000. Plans are also about completed for the construction of a $200,000 marine depot in Prince Ruport.

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GOODRICH STEAMER ALABAMA

THE latest addition to the fine fleet of passenger steamers of the great lakes is the new steel steamer, Alabama, just delivered to the Goodrich Transit Co., of Chicago, by the Manitowoc Dry Dock Co., Manitowoc, Wis.

This steamer is one of the most complete and elaborate craft of her size and kind on fresh water and no expense has been spared to provide for the safety and comfort of the passengers.

The subdivision of the hull by an unusually large number of water tight bulkheads makes the ship practically unsinkable and a complete automatic sprinkler system as well as special fire pumps afford absolute fire protection. All the refinements of modern equipment, such as wireless telegraph, refrigerating plant, running water in staterooms, drinking water systems, etc., have been installed.

The principal dimensions are as follows:

	Ft.	In.
Length keel	250	
Length over all	271	6
Beam, molded	44	
Depth to main deck	17	
Depth to spar deck	27	
Draught aft	12	6
Draught forward	9	
Gross tonnage	2626	
Net tonnage	1684	

There are five decks, viz:—orlop, main, spar, promenade and boat decks. The hull is constructed of mild steel, and divided into eight compartments by watertight bulkheads, and the orlop deck is watertight in Nos. 1, 2, 3 and 7 compartments.

Details of Construction.

The frames are 6 in. x 13.75 lb. bulb angle, spaced 24 in. and running to the main deck and 12 in. x 20.5 lb. channel belt frames, spaced 12 ft., run continuously to the spar deck. The main deck beams are 12 in. by 25 lb. channels, spaced 4 ft. The orlop decks are all steel and the beams are exceptionally heavy to stiffen the ship for ice work and the shell plating is doubled forward for the same purpose. The main deck is 15 lb. plate laid flush and covered in the cargo space with 3 in. fir decking.

Supporting the cabin or spar deck are 12 in. x 25 lb. channel belt beams, spaced 12 ft. and terminating on the belt frames, and which in turn support three I-beam fore and afters. The deck beams are 5 in. x 6.5 lb. channels spaced 3 ft. This deck is laid throughout with No. 10 w. g. plate to serve as fire protection between the cargo space and the cabins, and on which the 1⅛ in. matched deck is laid on battens.

The deck hands' accommodations are located in No. 2 compartment on the orlop deck, which has asbestos composition floor and steel berths. The No. 3 compartment contains the galley and refrigerators on the starboard side with brick floor. On the port side are the mess rooms and rooms for the cook's crew, floored with composition. All partitions are of steel with an open space at the top fitted with wire netting screens. The waiters are placed in the No. 7 compartment with floors and partitions similar to those forward.

The firemen and coal passers are accommodated on the main deck forward, the partition between the quarters and the cargo space being of steel.

On the main deck aft are located the lobby, baggage room, news stand, barber shop, pursers' and steward's offices and the men's toilet. The lobby is finished in vermilion wood with the borders of the panels enriched with inlay with a marble base to protect the wood work at the bottom. The floor is of asbestos composition with an art border. The purser's and steward's offices are panelled in mahogany and equipped for their purpose. Except for the toilet, which is ceiled in birch, all other rooms are finished in white enamel.

The Main Salon.

The grand staircase leads up the main salon, which is panelled in African mahogany. The panels are particularly large, extending from door to door of staterooms, and are built of beautiful crotch mahogany with inlaid borders and an inlaid figure showing a conventional design of the cotton plant. The cotton plant, which is associated with the name Alabama, is used throughout the ship as the motif of the design. At the after end of the engine trunk and directly facing the stairway is a large panel on which the coat of arms of the state of Alabama is worked in inlay. This, at a little distance might easily be taken to be a painting, and only close inspection shows that it is built up of many kinds of wood, each of its natural color.

At each side of the machinery trunk and leading forward is a wide passage finished in mahogany and terminating in the dining room. The stateroom numbers throughout are inlaid in the doors and enclosed by an inlaid border of the cotton plant.

The dining room is 38 ft. long and the full width of the boat, with large rectangular plate glass windows instead of the usual side lights. This room is finished in Prima Vera, an African wood, and is stained a beautiful shade of light green. The panels between the windows and elsewhere are each inlaid with a large spray of the cotton plant; at the after end is an imposing sideboard, built in, of the same wood, and in each after corner is a private dining room, one finished in cocoa wood, the other in Circassian walnut.

Forward of the dining room is the pantry, officers' mess, and rooms for the forward deck crew. The wireless room opens into the dining room, where messages may be filed and received.

The Promenade Deck.

On the promenade deck the entire cabin is given up to staterooms which are finished in old ivory enamel with mahogany doors. On this deck there are two public bath rooms, one for men and one for women. The promenade itself is especially wide and can accommodate hundreds of people without crowding.

The pilot house is located at the forward end of the boat deck, aft of the foremast. Aft of the pilot house are the captain's quarters, finished in natural birch finish. The balance of the forward cabin is devoted to six parlor rooms with a bath room in connection with each. These rooms are about 11 ft. by 12 ft. and are furnished with brass beds, couches, and dressers and each suite is differently decorated.

Aft of the stack are staterooms and rooms for the cabin maids. The after end of the cabin is used for a large buffet which is finished in Hungarian ash, stained a silver gray, bringing out the beautiful grain of the wood to the best advantage. There are eight alcove seats with leather upholstering, at the sides of the room. Paintings of woodland scenes are worked into the panels between the windows. The bar is at the forward end with two large refrigerators in

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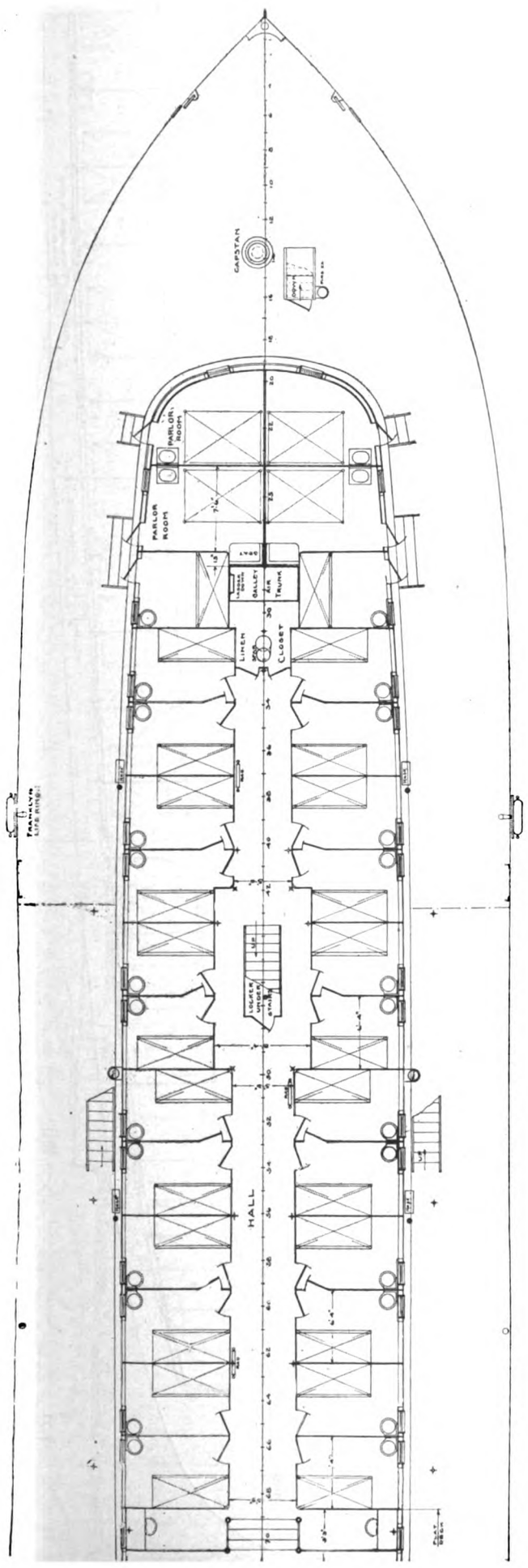

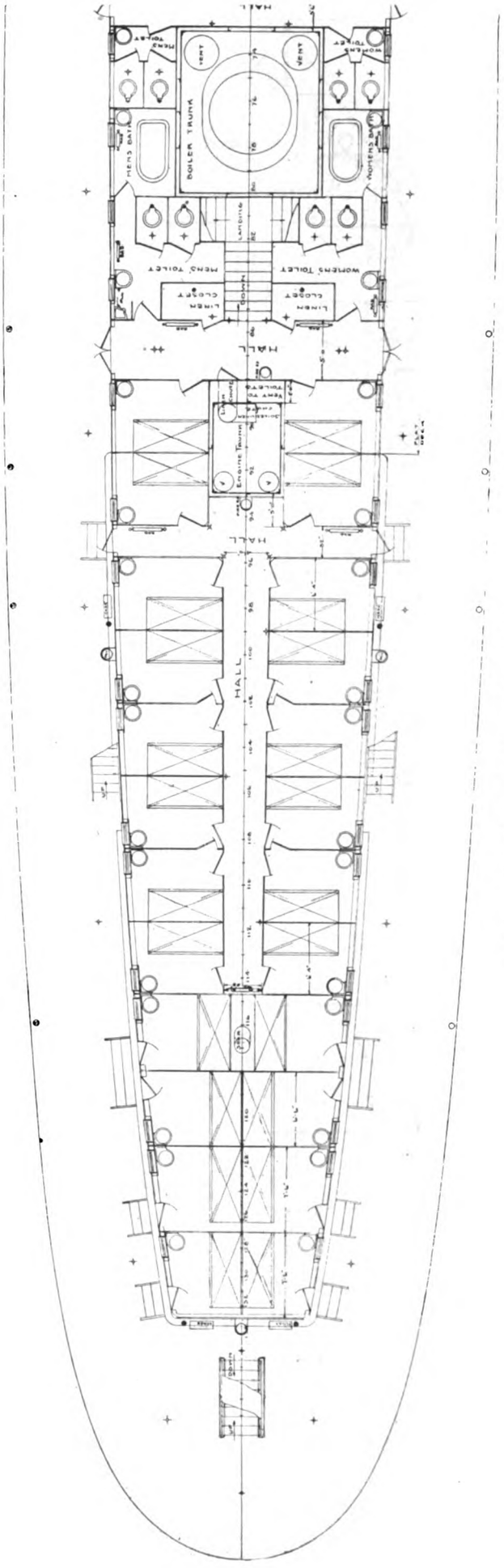

PROMENADE DECK, STEAMER ALABAMA.

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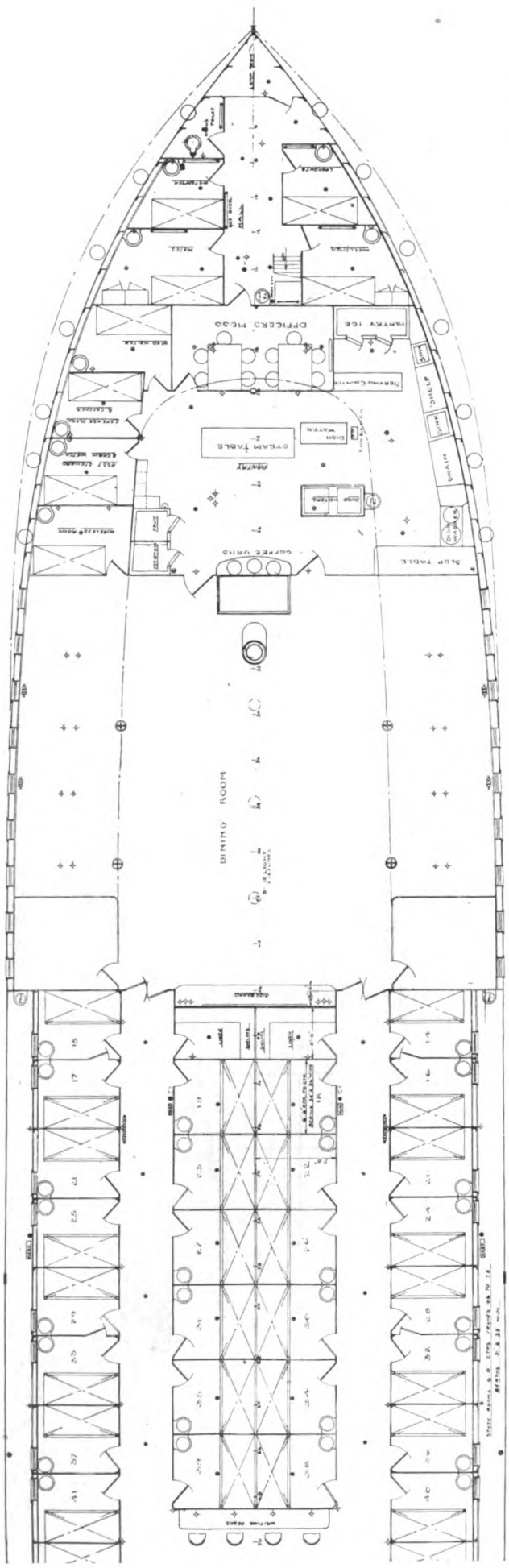

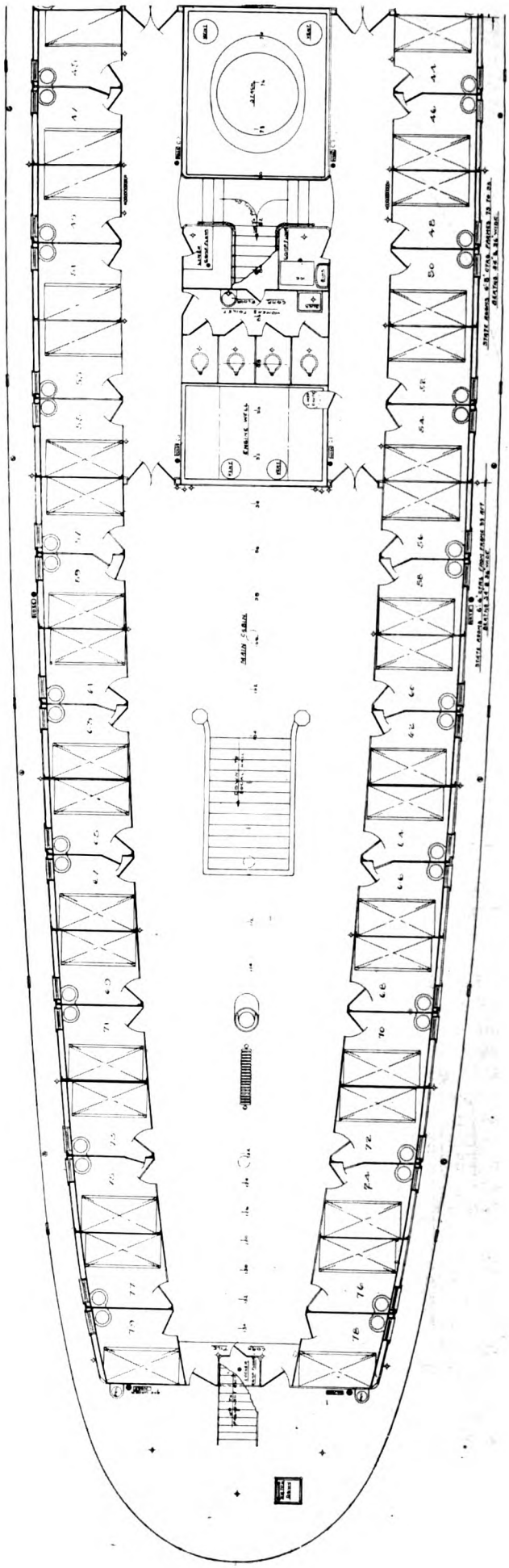

MAIN CABIN DECK, STEAMER ALABAMA.

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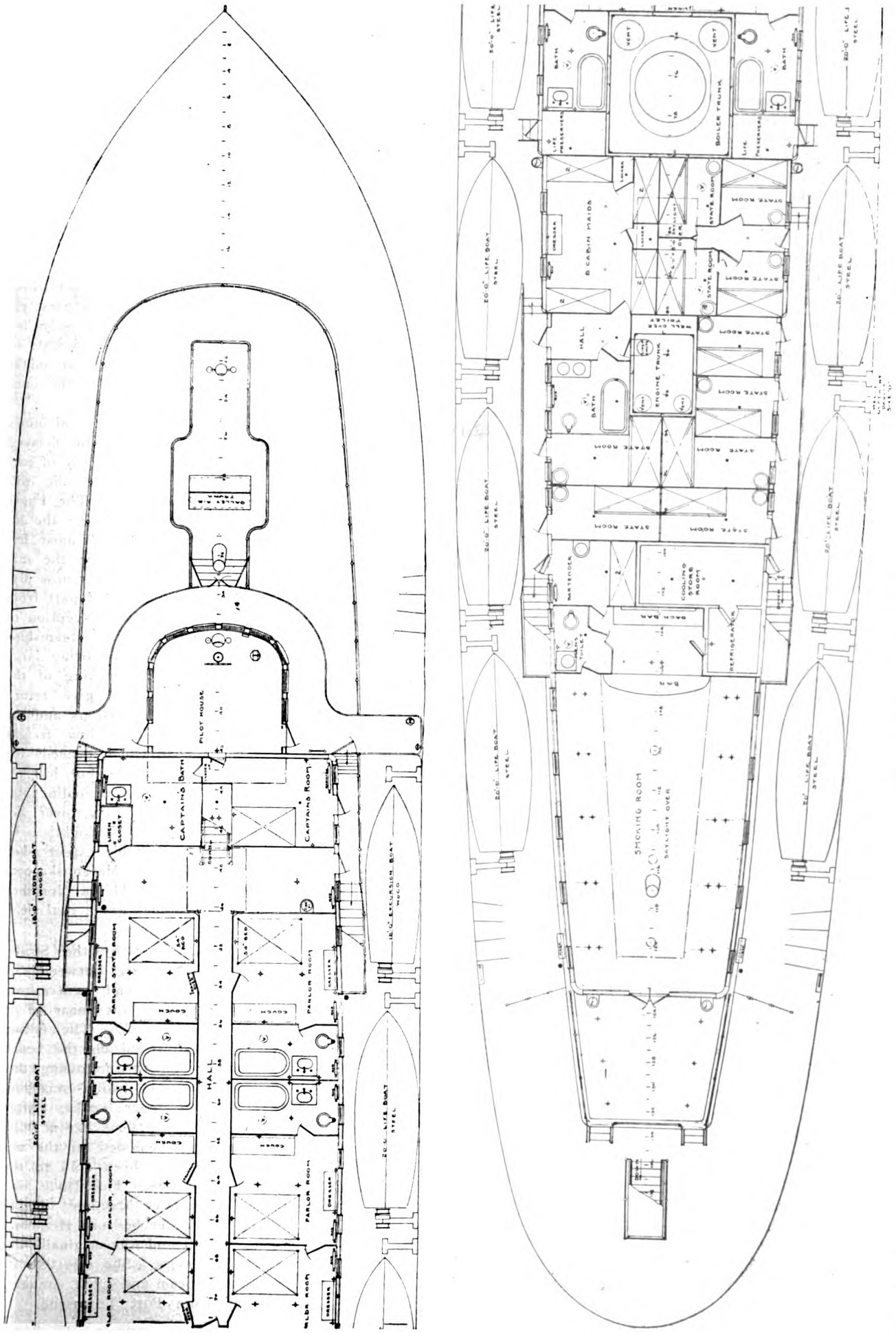

BOAT DECK, STEAMER ALABAMA.

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connection. Double doors lead from the buffet to an observation deck, where an unobstructed view of half the horizon may be enjoyed.

All of the toilets, bathrooms, and crew's rooms throughout the ship are laid with asbestos composition flooring, which is seamless, sanitary and practically impervious to wear. The hallways and buffet are floored with cork tile which is noiseless. The designing of the cabins was put in the hands of Abner Crossman, of Chicago, who previous to his retirement, was a leading decorator of the city.

Auxiliary Appliances.

The Alabama is equipped throughout with all the latest improved appliances for the safe-guarding of the passengers against fire and the elements. The twelve large life boats are handled by Welin quadrant davits. The Alabama is the first boat on the great lakes to be entirely equipped with these davits. A sprinkler system in all parts of the ship, with thermostats in every room and elsewhere, augment the regular fire system, which is served by a large vertical fire pump of the fire boat type. Push buttons and thermostats operate annunciators in the purser's room, engine room and on the bridge. Schuette recording compasses, made by the Schuette Recording Compass Co., Manitowoc, Wis.

The steering gear is of the Williamson differential type directly attached to the rudder stock and operated by the Williamson telemotor. A hand gear is also located on the upper deck, aft.

All the state rooms and crew's rooms are provided with wash stands, supplied with running water. The electric plant consists of three 35-kilowatt General Electric Co.'s turbo-generators operating 1,500 incandescent lamps and a 5,000 candle power search light. Emergency electric lights are furnished with current from a storage battery. These lights provide illumination in the corridors and stairways in case of accident to the generating apparatus. The storage battery in use is composed of 56 cells type E T, chloride accumulator in glass jars, manufactured by the Electric Storage Battery Co., Allegheny avenue and Nineteenth street, Philadelphia. There are two hydraulic freight elevators with platforms 8 ft. square.

The propelling machinery consists of one triple expansion engine, with cylinders 23 in., 38 in., 62 x 36 in., driving a sectional four-bladed propeller of 12 ft. in diameter, 120 r. p. m. and developing 2,250 H. P.

The condensing outfit includes a surface condenser with an area of three thousand square feet, an 8-in. double section, centrifugal circulating pump direct connected to a 6-in. x 6-in. engine, and a 16-in. x 32-in. Prat-Rotrex air pump.

The auxiliaries consist of feed, general service, bilge, sanitary and fresh water pumps, an Ahren's 10-in. x 6-in. x 8-in. vertical fire pump and two 30-in. water filters.

The refrigerating plant, using the carbonic anhydride process machine, is installed in the engine room and piped to the various refrigerators in all parts of the ship.

The boiler installation consists of a battery of three Scotch marine boilers 12 ft. 6 in. diameter and 11 ft. long, carrying 180 lb. of steam. The boilers are placed three abreast across the ship with a common uptake and there is a 12 ft. fire hold and an athwartship coal bunker. Each boiler has two 48 in. Morison furnaces and 286 3-in. tubes, 8 ft., 5/8 in. long. The grate surface is 48 sq. ft. and the heating surface 2,020 sq. ft. for each boiler. The draft is a modified Howden system, with a 48-in. fan direct connected to a 7-in. x 7-in. engine running 400 r. p. m. The fan is placed in the engine room on the main deck and tends to make the machinery space very comfortable. Two 36-in. ventilators also lead into the fire room and the stokehold is unusually cool.

Passenger Steamer for Puget Sound

The Puget Sound Navigation Co. has closed a contract with the Moran Co., of Seattle, for the construction of another day passenger steamer for use on its run from Seattle to Irondale and Port Townsend, Wash. The new vessel is to be named the Sioux, and will measure 155 ft. over all length, 23 ft. molded beam, and 8 ft. 6 in. molded depth, with a carrying capacity of 400 passengers. Although not as large as some of the Puget Sound Navigation Co.'s boats, the Sioux will be finely finished throughout in hardwood, with the interior of the cabin and dining saloon done in mahogany. On the boat deck will be quarters for the officers, and on the main deck forward a smoking room. Her propelling machinery will consist of a triple expansion engine built by the Moran Co., and water tube boilers fitted for oil fuel. The Sioux will cost approximately $125,000 and it is planned to have her completed about December, 1910. Frank E. Burns is manager of the Puget Sound Navigation Co.

Navy Coaling Station

Preliminary surveys are being made at the navy yard, Puget Sound, for a 200,000-ton coaling station, to be located at the west end of the navy yard. If congress will make the necessary appropriations for the purpose, the department contemplates making at the navy yard the coaling station for the Pacific fleet, at which is to be kept at all times a great reserve supply of coal, not only for present purposes, but sufficient to meet any demand which war might make upon the resources of the country.

With the opening of the coal mines of Alaska, which cannot be delayed many years further, the supply of coal for naval uses on the Pacific will come from those mines. The Puget Sound yard will naturally be the location of the largest and most important coaling station, for the majority of commercial vessels now plying to Alaska arrive and depart from Puget Sound. With the exception of an occasional cargo, the steamships plying to Alaska do not bring large return cargoes. The opening of the Alaska coal mines will give return cargoes for many steamships and the government should get low freight rates on the coal which it needs for naval uses. The department has reserved a site for a naval coaling station on Resurrection Bay, near Seward, Alaska, which will doubtless be utilized to a considerable extent when title is released to the Matanuska coal lands and when the Alaska Northern is completed to that great coal field.

The Dode, owned by the Straits Steamship Co., plying between Seattle and Port Townsend, went ashore at Marrowstone Point near Port Townsend on July 20. The falling tide left her stranded on the beach and a storm on the following day pounded the vessel badly, smashing her house and upper works. After several attempts to float her at high tide, she was abandoned to the underwriters and has been sold to the insurance adjusters. The Dode was a small passenger steamer of 215 tons gross register built at Hoquiam, Wash., in 1896, and was originally the William J. Bryant. She was 98.8 ft. long, 21.6 ft. beam and 7.9 ft. draught, registered from Port Townsend.

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A LARGE BLACKSMITH SHOP USING OIL FUEL EXCLUSIVELY

A Modern Pacific Coast Plant and Its Unique Liquid Fuel Equipment and Shop System

By Holden A. Evans, Naval Constructor United States Navy.

THE smith shop at the Mare Island navy yard is one of the principal objects of interest to all visitors to this naval station. The shop is located on the main thoroughfare of the yard, immediately adjacent to the park and the administration building. A blacksmith shop surrounded by flowers and trees is a novelty, and the casual visitor, as he looks in an open door, is further surprised to see a smith shop, neat and clean and absolutely lacking in smoke and grime, which are expected in a shop of this character. So attractive is the shop that difficulty is experienced in keeping the shop clear of visitors, notwithstanding the numerous signs that visitors are not allowed in the shop. The shop is even more interesting to the manufacturer and the engineer, and for the past four years I have had numerous inquiries for data regarding its operation, not only from manufacturers and engineers on the Pacific coast, where the reputation of the shop is established, but also from the east coast as well. The interest in this shop is principally due to the successful use of fuel oil for all purposes, but the methods of management under an efficient foreman also receive considerable attention.

Fuel Oil Adopted For All Purposes.

Five years ago the use of coal as a fuel was abandoned, and oil was used for all purposes. While it had been known for some years previous that oil gave satisfaction in a furnace and was extensively used for the purpose, there were few who believed that oil could be used in an open forge. While it is known to the author that several were experimenting with oil in open forges at this time, it is believed that the smith shop at Mare Island was the first shop in the world to entirely abandon coal and substitute oil as a fuel.

Opposition to Oil as a Fuel.

To visit the shop today and note the great improvement compared with coal, it is difficult to believe that anyone—much less the workmen—could have opposed the introduction of oil as a fuel. Such, however, was the case, and I encountered much opposition and many difficulties in making the change. Some of the opposition was due to the natural conservatism of workmen and the general tendency to oppose a radical change simply because it is a change. Again, greater care is required on the part of the workmen in regulating the fire than is necessary with a coal fire. This was very noticeable when the installation was first made, as the best means for obtaining satisfactory regulation of the fire with minimum attention had not been developed. Since that time this difficulty has been overcome, and the fires are more easily regulated than with coal. But the controlling reason for the greater part of the opposition was that with an oil fire the heats are taken in less time than with a coal fire. If the work at a coal fire is analyzed it will be found that the smith and helpers are waiting for heats a great part of the day. The oil fires greatly reduced the waiting time; in other words, the smith and helpers necessarily work harder than with a coal fire. As the men were not working by the piece, it was quite natural that they should oppose a change which required more work from them without additional compensation. Every possible objection was raised against the use of oil. First it was claimed that satisfactory work could not be accomplished in an oil fire, but this was clearly disproved, as will be shown later. The men then claimed that the intense heat was ruining their eyes, and that the noise of the pressure blast was slowly making them deaf. The opposition was very strong and the protest against the use of oil, signed by every man in the shop, was submitted to the secretary of the navy, but was wisely over-ruled. The complaint was never made that with oil the men had to work harder, yet this was, without doubt, the real reason for the opposition. One of the best men in the shop was approached some time later and asked which kind of fuel he preferred, and he answered that he preferred coal, and when asked for his reason, he honestly and frankly stated that oil made the men work too hard,—that it made old men of them.

When it was found that oil had come to stay, a number of the men left and found work in the coal-burning shops in other departments in the yard or in shops in the vicinity, but have come back and are today employed in the oil-burning shops. A few years' time has entirely removed the opposition and the men have acquired new habits of industry, and are perfectly contented with the new conditions. It is certain that there is not a man in the shop who would willingly see the shop go back to the old conditions of smoke, grime and soot.

Difficulties Due to Faults of Installation.

When the change from coal to oil was made, many difficulties, due to faults in the installation, were encountered. Before making the change, I had made many experiments and had successfully operated several forges for months. Notwithstanding the knowledge thus gained, it was found that when the attempt was made to operate the entire shop with oil, many unforeseen obstacles appeared. On account of the more or less experimental nature of the installation, piping already in the ground and used some years before with an unsuccessful gas plant was utilized. This piping was not entirely suited to the installation, and its use will explain the complicated leads shown in the plans. The desire to keep down the first cost of the installation also brought about difficulties in operation. In other words, it was feared that the change might not be a success, and an attempt was made to effect the change at the least possible expenditure of money, and the difficulties always attending every change made under these conditions, were encountered.

In the installation as first made,

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heaters were placed at various points in the oil pipes to raise the oil to the proper temperature. A large heater was placed in the oil pipe suction, another was placed in the distributing pipe at the entrance to the shop, and two were placed in the shop. This seemed sufficient, but difficulties were immediately encountered. It was found impossible to keep the temperature uniform. For the oil used, 15 to 20 gravity, a temperature of 120 degrees Fahr. should be maintained. In actual practice it was found that the temperature varied from 90 to 160 degrees. One fire was getting oil so cold that it could not be atomized, while at another fire the temperature was so high that carbon was deposited and the burner was clogged.

Another difficulty experienced was due to cold oil in dead pipes. When the fires were started in the morning, or if a forge not in use near the end of a line was started, a satisfactory fire was not obtained until the cold oil in the dead piping had been used. Consideration was given to the plan of placing a heater at each fire. This involved long leads of steam piping and, furthermore, it was not thought that the smiths would give sufficient attention to the regulation of the heaters.

Another serious fault with the original installation was that inadequate provision had been made for removing water from the oil. It was at first considered that by settling the water in the main supply tanks and draining, no trouble would be experienced. In practice it was found that frequently the fires were put out by water. I received but little aid from the shop in meeting these difficulties. The foreman then employed had but little experience with oil, and he was no great advocate of its use, while the men openly opposed it. Under these conditions, as I was personally responsible for the installation, it was necessary for me to overcome the difficulties, and this was finally accomplished.

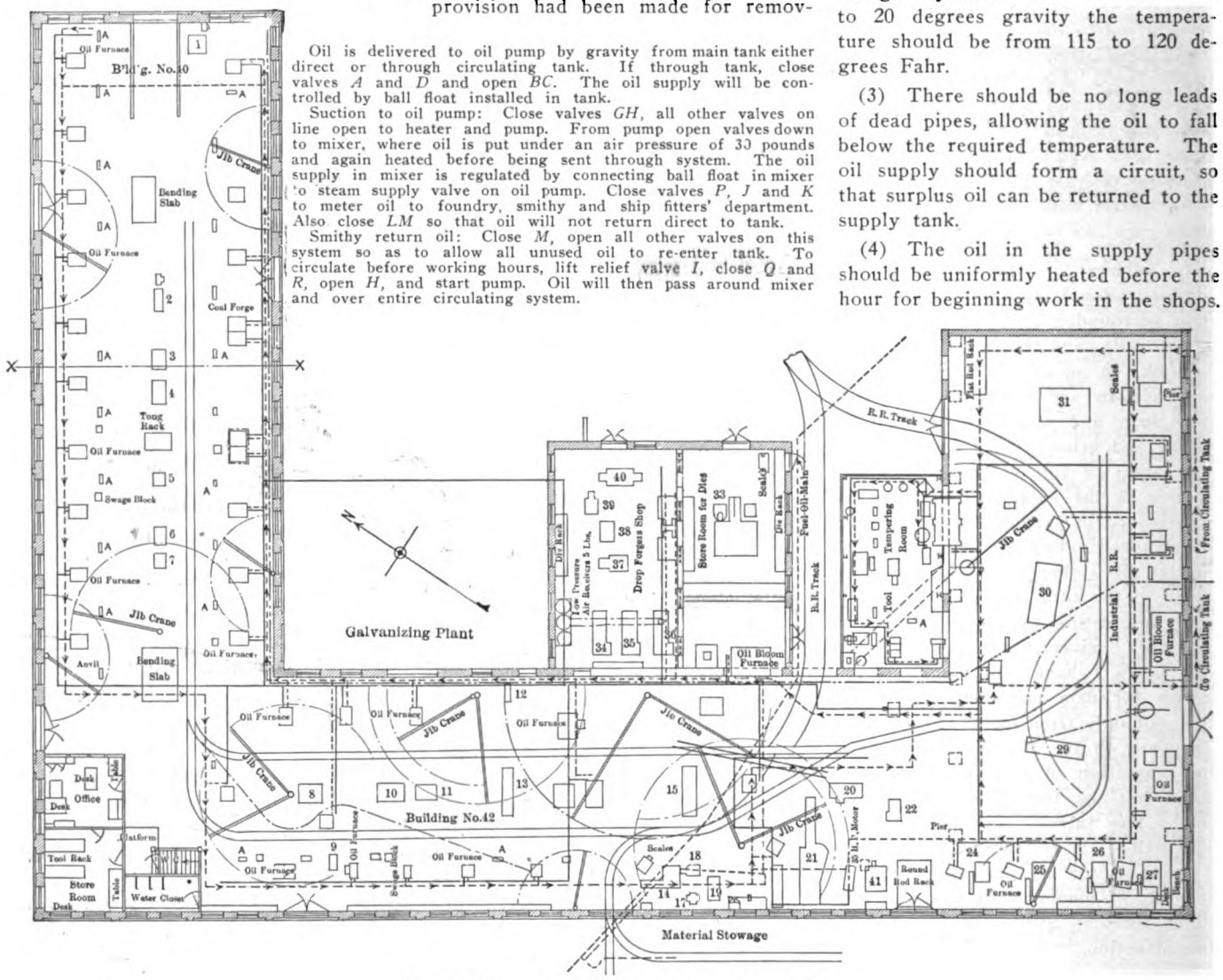
Oil is delivered to oil pump by gravity from main tank either direct or through circulating tank. If through tank, close valves A and D and open BC. The oil supply will be controlled by ball float installed in tank.
Suction to oil pump: Close valves GH, all other valves on line open to heater and pump. From pump open valves down to mixer, where oil is put under an air pressure of 30 pounds and again heated before being sent through system. The oil supply in mixer is regulated by connecting ball float in mixer to steam supply valve on oil pump. Close valves P, J and K to meter oil to foundry, smithy and ship fitters' department. Also close LM so that oil will not return direct to tank.
Smithy return oil: Close M, open all other valves on this system so as to allow all unused oil to re-enter tank. To circulate before working hours, lift relief valve I, close Q and R, open H, and start pump. Oil will then pass around mixer and over entire circulating system.
Galvanizing Plant
Building No.42
Material Stowage
R. R. Track
Jib Crane
Oil Furnace
Bending Slab
Tong Rack
Swage Block
Anvil
Coal Forge
Drop Forging Shop
Store Room for Dies
Tool Tempering Room
Oil Bloom Furnace
Scales
Round Rod Rack
Tool Rack
Store Room
Office
Desk
Table
Water Closet
Platform
Pier

FIG. 1—GENERAL ARRANGEMENT OF SMITH SHOP.

Conditions Necessary for the Successful Use of Oil.

Unless the following conditions are fulfilled, difficulties will be experienced in burning oil:

(1) The water must be effectively removed from the oil.

(2) The oil must be uniformly heated, the temperature depending on the gravity of the oil. For oil of 15 to 20 degrees gravity the temperature should be from 115 to 120 degrees Fahr.

(3) There should be no long leads of dead pipes, allowing the oil to fall below the required temperature. The oil supply should form a circuit, so that surplus oil can be returned to the supply tank.

(4) The oil in the supply pipes should be uniformly heated before the hour for beginning work in the shops.

(5) The oil pressure and the air pressure should be reasonably uniform.

(6) The burner used should be of a type that will not easily stop up, and should be easily regulated. Burners suitable for the higher gravity oil used on the Atlantic coast are not suitable for California oil.

General Arrangement of Oil and Air Apparatus.

The general arrangement of the shop is shown in Fig. 1, and the air and oil piping is outlined. The arrangement of the oil pumping and oil circulating systems is shown in Figs.

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2 and 3. It will be remembered that much piping already run was utilized; also that numerous changes were made after the first installation; these two causes account for the indirect leads shown. For the sake of clearness the diagrammatic sketch given in Fig. 3 shows the arrangement finally secured, and which proved to be entirely satisfactory.

An auxiliary tank of 409 gallons capacity, marked *A*, is filled by gravity from the main supply tanks, the supply being controlled by an automatic float valve which keeps the tank about two-thirds full. The tank is fitted with a steam coil for heating the oil to a temperature of 120 degrees Fahr. and with a gage glass which shows the amount of oil and water in the tank. At the bottom there is a valve for drawing off the water, and at the top a vent pipe for escape of gas.

The suction from the tank is taken a short distance below the level of the surface of the oil so that the pump cannot draw water, unless the tank is half full of water. The pump *B* draws from this tank and discharges into a strongly built small tank, *C*. The throttle valve of the pump is controlled by an automatic float valve in tank *C*. The pump also has a suction from the main supply line and from reserve tanks near the shop, so that in case of accident to the first supply, there are two other sources which may be utilized. In this suction line there is a large heater. There is a small air compressor which has an automatic pressure control set at 30 pounds, and the discharge from which is led to the top of the tank *C*, putting the oil under a pressure of 30 pounds. Air pressure for this tank may also be obtained from the high pressure air mains, there being a connection with a reducing valve fitted for this purpose. In the absence of air pressure the oil pump itself could supply the pressure, but the pulsations of the pump result in a slight unevenness of the fires at the forges.

From the tank *C* the supply pipe is led the circuit of the shop and from this circuit short leads are taken to the furnaces and forges. The supply main finally returns to the auxiliary tank *A*, and at the tank in this main there is a relief valve set at 15 pounds. There is, therefore, a complete circuit, but to control the pressure in the supply pipe the return circuit cannot discharge into the tank until the relief valve lifts. The pressure at the beginning of this circuit is, therefore, 30 pounds and the terminal pressure 15 pounds.

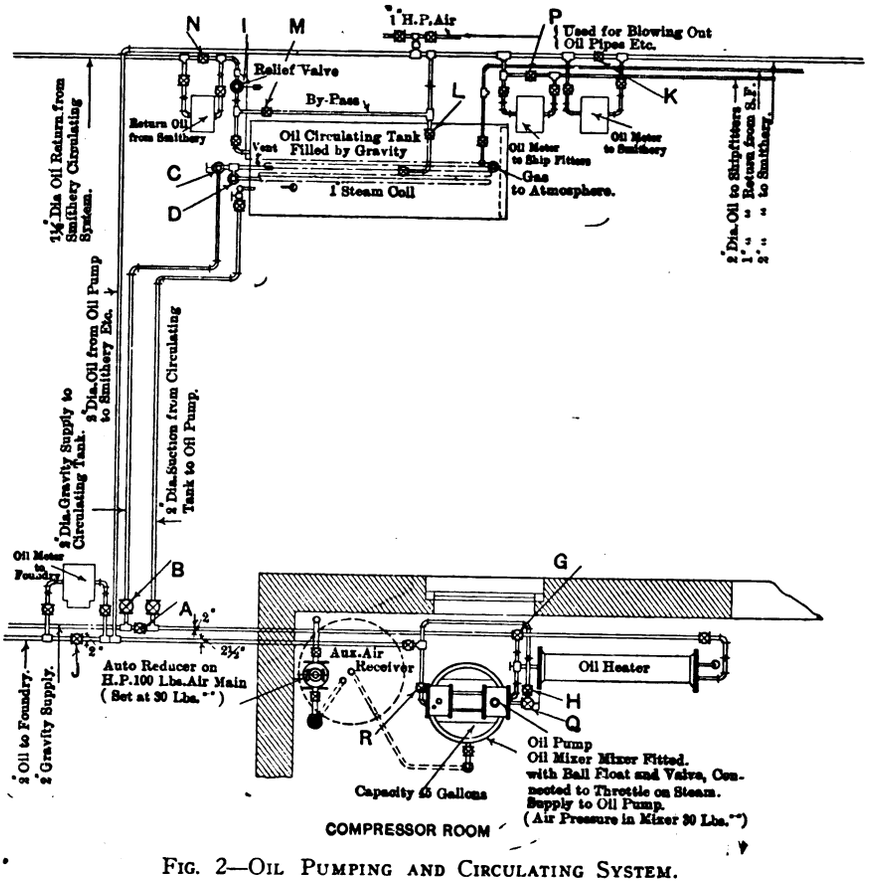

FIG. 2—OIL PUMPING AND CIRCULATING SYSTEM.

In the morning, half an hour before work begins, the relief valve *E* is lifted and the pump *B* started, drawing from tank *A* and discharging back through the supply main into the same tank. The heater in the tank heats the oil, the cold oil is removed from the pipes, and all is heated to a uniform temperature by starting time, when the relief valve is again set. During the noon hour in cold weather the oil is circulated in the same manner. The water is drawn from tank *A* as soon as any shows in the glass.

Air for Atomizing.

The general arrangement of the air piping and the location of the blowers are indicated on the general arrangement plan of the shop, Fig. 1. Air is supplied by three high-pressure positive blowers, each of which is capable of delivering 1,200 cubic feet of

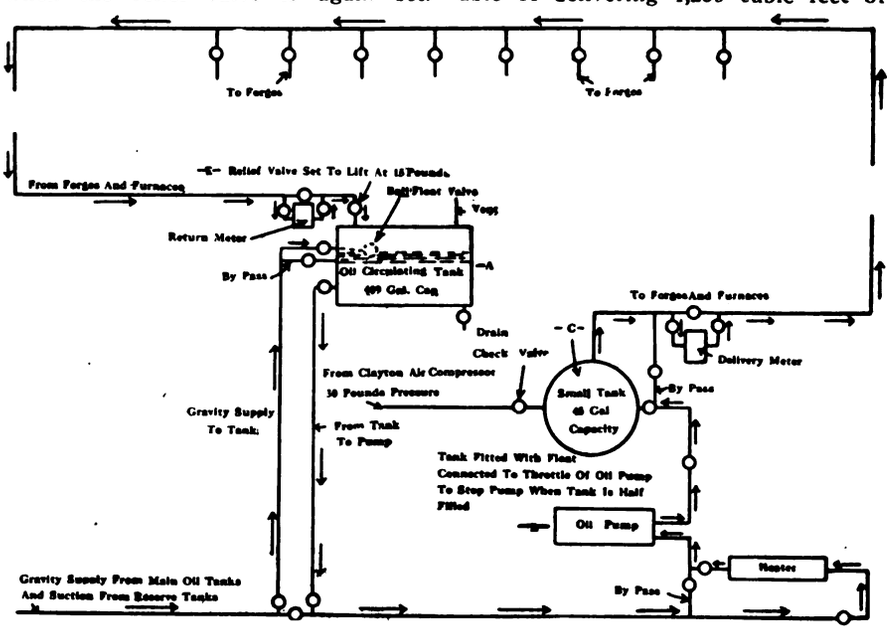
To Forges
To Forges
Relief Valve Set To Lift At 15 Pounds
From Forges And Furnaces
Ball Float Valve
Return Meter
By Pass
Oil Circulating Tank 409 Gal. Cap.
A
To Forges And Furnaces
Drain
Check Valve
C
Delivery Meter
From Clayton Air Compressor 30 Pounds Pressure
Small Tank 45 Gal Capacity
By Pass
Gravity Supply To Tank
From Tank To Pump
Tank Fitted With Float Connected To Throttle Of Oil Pump To Stop Pump When Tank Is Half Filled
Oil Pump
Heater
Gravity Supply From Main Oil Tanks And Suction From Reserve Tanks
By Pass

FIG. 3—DIAGRAMMATIC SKETCH OF FUEL OIL SYSTEM.

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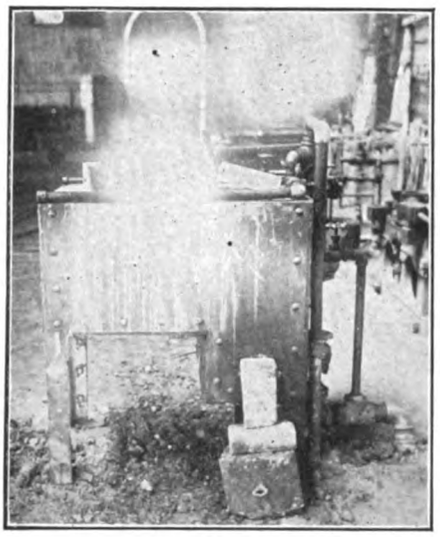

FIG. 4—EXPERIMENTAL LOW-PRESSURE FORGE.

air per minute at six pounds pressure. Each of these blowers is driven by a 40-horsepower, direct-connected, direct-current, variable speed, 220-volt motor. It was found that excellent results were obtained with four pounds pressure and the blowers are run at this pressure. The pressure is automatically maintained by means of regulators made by the Mason Regulator Co., Boston, Mass., for the Cutler-Hammer Mfg. Co., Milwaukee, Wis.

While it is believed that the four pounds pressure is best for all around work, there is no doubt that satisfactory results can be obtained from a fan ballast pressure of 8 to 12 ounces. In small shops, where the first cost of positive pressure blowers would make this installation prohibitive, the low pressure forge has a field of its own. I experimented for some time with the low pressure forge and developed one which gave excellent results. This forge was operated for several weeks on all classes of work. It required more attention than the higher pressure forge, and as it possessed no advantages over the latter, the use of the fan blast pressure was abandoned. The photo-reproduction given in Fig. 4 shows a forge operating at 8-ounce pressure; the excellent character of the fire obtained can be seen in the photograph.

Type of Forge and Burner.

The type of forge used is shown in Fig. 5. This is a double forge, the single forge being half the size. The arrangement and dimensions of the combustion chamber and the passage from the burner to this chamber are the results of five years of experience and study, and give excellent results. The sketch is self-explanatory, and few explanations are necessary. The number of fire brick required is less than originally used, and it is believed that the minimum has been reached. The atomizing air pipe should enter the burner on the top, as shown. When first installed this pipe entered the bottom of the burner, but with that arrangement, a leaky oil valve, when the forge is not in use, fills the air pipe back to the air valve. When the fire is started the oil collected in the air pipe will be blown out and flood the forge, causing clouds of black smoke. With the arrangement shown a leak will soon be noted. The clean out plug in the oil pipe where it enters the burners permits of ready clearing of any obstructions in the burner.

The details of the burner are shown in Fig. 6. Many types of burner have been tried and the one shown has proved to be not only the most economical, but also easily regulated. With this type of forge and burner, fires are easily and quickly started from a cold forge. Greasy waste is collected from the machine shop and kept in a metal box outside the smith shop; a small piece of this waste lighted readily starts the forge fire.

With uniformly heated oil, uniform air and oil pressure, and the type of burner shown, the forge fire is properly regulated with very little attention, and either a steady forging heat or a steady welding heat can be maintained with very little manipulation of the valves.

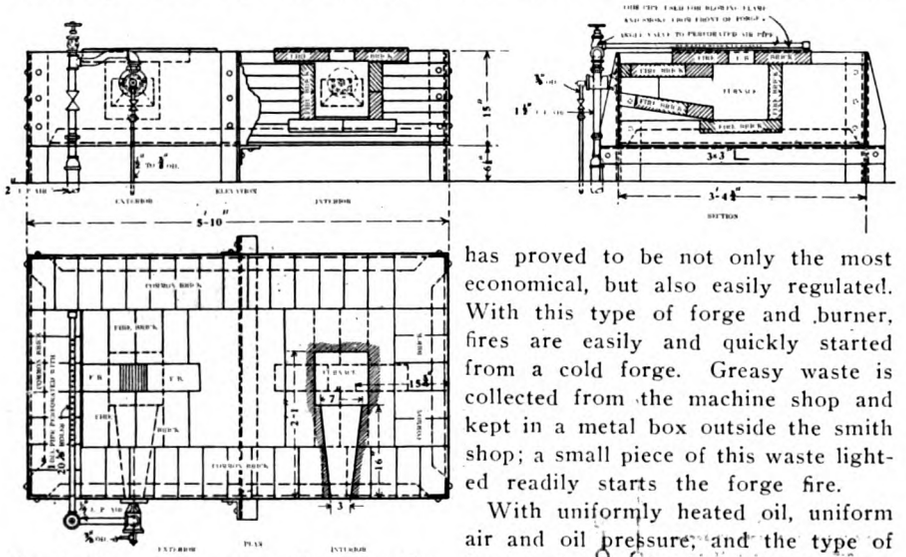

FIG. 5—TYPE OF SMITHING FORGE FOR OIL FUEL.

The same type of forge and burner as shown are used in the tool dressing and tempering department. A smaller size forge is used for tempering high-speed tool steel and is shown in Fig. 7. Better results have been obtained from high-speed steel tempered in this forge than from tools tempered in a small furnace. No difficulty is experienced in obtaining the necessary high temperature and the tool is only heated a short distance back from the cutting point.

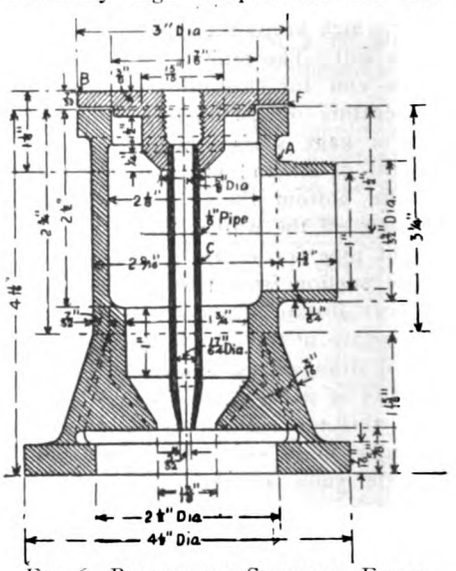

FIG. 6—BURNER FOR SMITHING FORGE.

The type of bloom furnace is shown in Fig. 8. There are three furnaces of this general type in the shop. The first two were built with a flue leading to a smoke stack. In making repairs to one of these, it was discovered that the flue was entirely closed and it was evident that it had been closed for some time. In constructing a new furnace the flue was omitted and this furnace has given entire satisfaction. The type of burner used is the same as the burner used on the foges, but larger. The details of the burner are given in Fig. 9.

The type of furnace used for the bolt and rivet machines is given in Fig. 10. It will be noted that steam is used in the perforated pipe in front of the furnace for keeping the flame away from the operator, as it is more satisfactory for this purpose than the low pressure air and the cost is less. The burner used on this furnace is the same as that shown in Fig. 6.

Quality of Work From Oil Burning Forges.

Even in this day one hears doubts expressed by some well informed en-

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gineers of the quality of work produced from an oil fire. These doubts should be set at rest, for they have no foundation. It has been stated that reliable welds cannot be made in an oil fire, but this is not correct. When oil was first used I fully investigated this subject. Two good smiths were selected and many experimental welds were made both with coal and oil. The specimens for the comparative tests were taken from the same bar, and the smiths were changed from oil to coal and *vice versa* to eliminate any superiority in skill, and the welds were tested. These experiments were made both in iron and steel, and the results showed a slight superiority of the welds made in the oil fire. In making a weld with oil, however, where the two parts are close together in the fire, as is the case in welding a chain link, care must be taken that the parts to be welded are at a welding heat throughout. The heat is taken so quickly that a smith not accustomed to oil may obtain a welding heat on the surface only, and he will obtain a surface weld, which can only be discovered by breaking it. This may happen with an inexperienced man on other classes of welds, but is more apt to happen where the parts are close together.

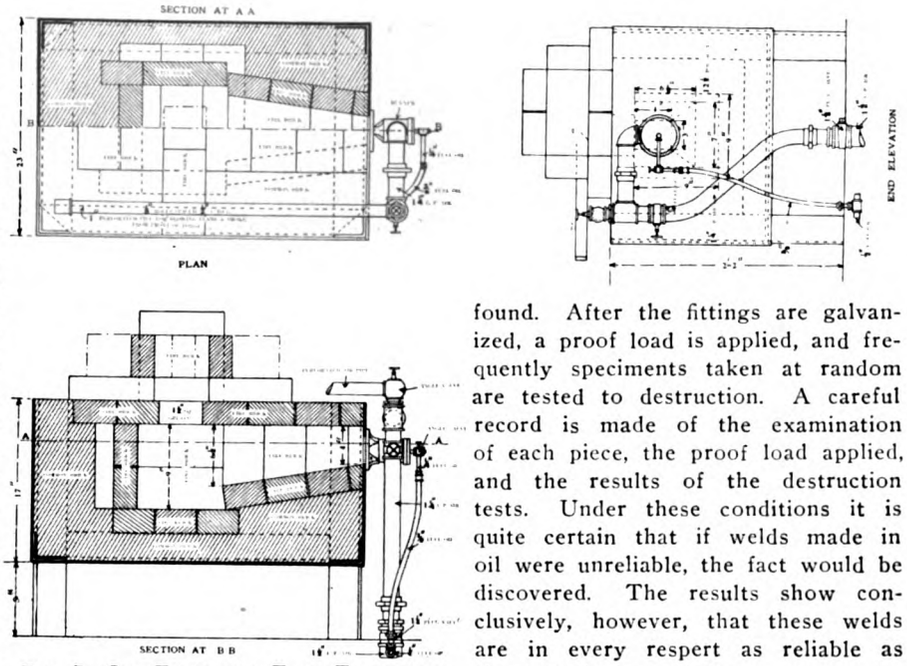

FIG. 7—OIL FORGE FOR TOOL TEMPERING.

In the shop under consideration there is a great deal of work on ships' fittings, where life depends on the reliability of the welds, such as boat hangings, anchor gear, fittings for spars, etc. It is absolutely essential that these fittings should be reliable. All fittings of this kind are carefully inspected after pickling for galvanizing, when the defects can best be found. After the fittings are galvanized, a proof load is applied, and frequently speciments taken at random are tested to destruction. A careful record is made of the examination of each piece, the proof load applied, and the results of the destruction tests. Under these conditions it is quite certain that if welds made in oil were unreliable, the fact would be discovered. The results show conclusively, however, that these welds are in every respect as reliable as those made in coal fires.

Iron work for spars is rather difficult in any fire; for example, a mast band with four or five eyes which have to be "jumped on". The advantage in this class of work is decidedly with the oil fire, as the heat can be localized and obtained exactly where wanted, without heating the remainder of the work, and with oil the fire is absolutely clean, and the heat uniform, both of which are conducive to good work, particularly in welding. Still another advantage is the better conditions under which the men work. With oil, a fire once started should not smoke; if it does smoke, it shows inattention on the part of the smith in not regulating the combination of oil and air. With oil a clean shop can be maintained, the workmen are free from the smoke and fumes common to all coal-burning shops, and, working under better conditions, the men can and should produce more and better work.

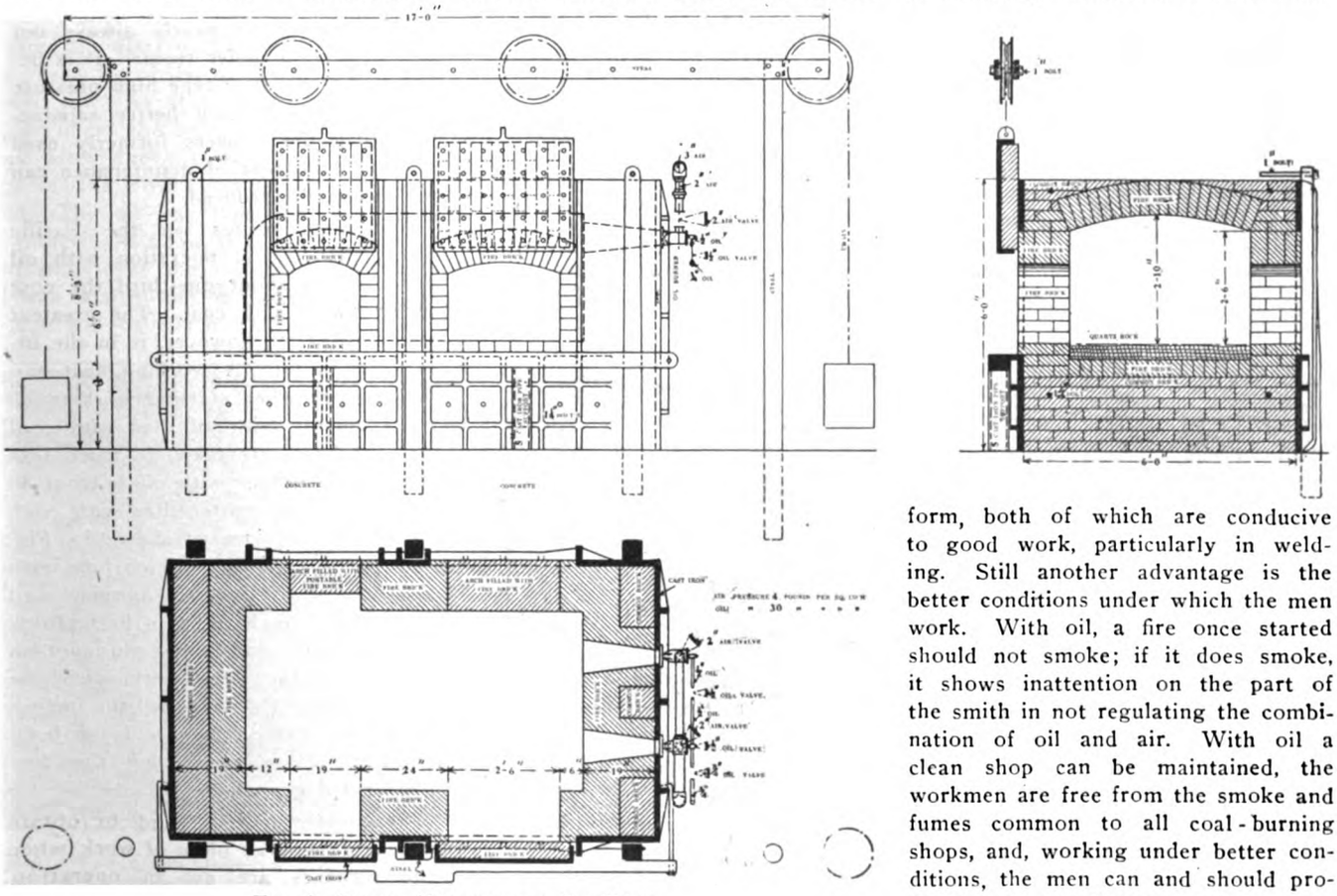

FIG. 8—BLOOM FURNACE FOR OIL FUEL.

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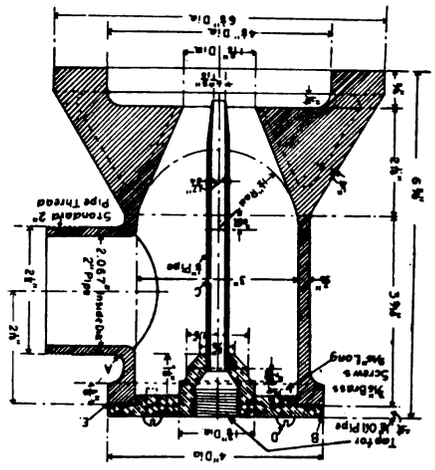

FIG. 9—DETAIL OF BURNER FOR BLOOM FURNACE.

Every class of work has been done in this shop in oil fires and in all classes but one, the oil fire has been found superior to coal. In very light angle work involving welds, the coal fire is superior, as the heat of the oil fire is so intense that the metal each side of the weld is likely to be wasted away.

A comparison of the cost of operation with coal and oil depends principally on the cost of the fuel. On the Pacific coast fuel oil is cheap while the cost of coal is high; while on the Atlantic coast oil costs more and coal less. The advantages of fuel oil are, therefore, greater on the Pacific than on the east coast.

The consumption of oil depends on the size of the fire and the class of work. It also depends on the type of burner and the care of the smith in shutting off the oil supply while working the heat. In the past two years we have materially reduced the oil consumption by improvements in the burner and forge, and by exercising more care in shutting off the oil when not needed.

In comparing the cost of operation, account should be taken of the cost of firebrick, cost of air for atomizing, and interest and depreciation of the increased first cost of installation. With all these considered, the cost of operation on the Pacific coast is much less with oil than with coal. In a medium size forge on general work the consumption of coal is about 250 pounds in eight hours. On the same class of work the consumption of oil is about 16 gallons in eight hours.

The cost of good blacksmith coal is from $12 to $16 a ton, while the cost of oil is about 2 cents a gallon; the cost of fuel for such a fire will, therefore, be about $1.50 for coal, and for fuel oil about 35 cents. The average consumption of fire brick is 2 1-5 bricks per forge per day. About one-half of these are for the forge proper and one-half for the upper brick over the work. The cost of fire brick averages 7½ cents a day per forge.

The cost of electric current generated from oil fuel is about 1½ cents per kilowatt hour, and at this rate the power cost for operating the blowers for the shop is about $8.50. The difference between this cost and the lesser cost of operation of a fan blast for coal fires is more than offset by the cost of handling and hauling coal and ashes for a coal fire. The cost of maintenance of the high-pressure blowers is heavy, and after several years service it is found that one of the blowers is nearly always out of commission under repair. It is believed that the new type high pressure fan blower will give better satisfaction than the blowers formerly used and that the cost of maintenance can be materially reduced.

For open forges on the Pacific coast, the cost of operation with oil as a fuel is about one-third the cost of operation with coal. The greatest economy of all, however, is in the increased output. A working heat can be obtained when starting work much more quickly with oil than with coal and the heats are taken in much less time. The output with oil is from 40 to 50 per cent greater than with coal. In the bloom furnace shown in Fig. 8 the consumption of oil starting with the furnace cold in the morning and forging a 10-inch billet is 160 gallons in eight hours, while the consumption of coal on the same work would be not less than 1¼ tons, and the output from the oil-fired furnace is at least one-third more than from the furnace burning coal.

Frequently it is desired to obtain a heat on a large piece of work when the furnaces are not in operation. This can be readily accomplished by

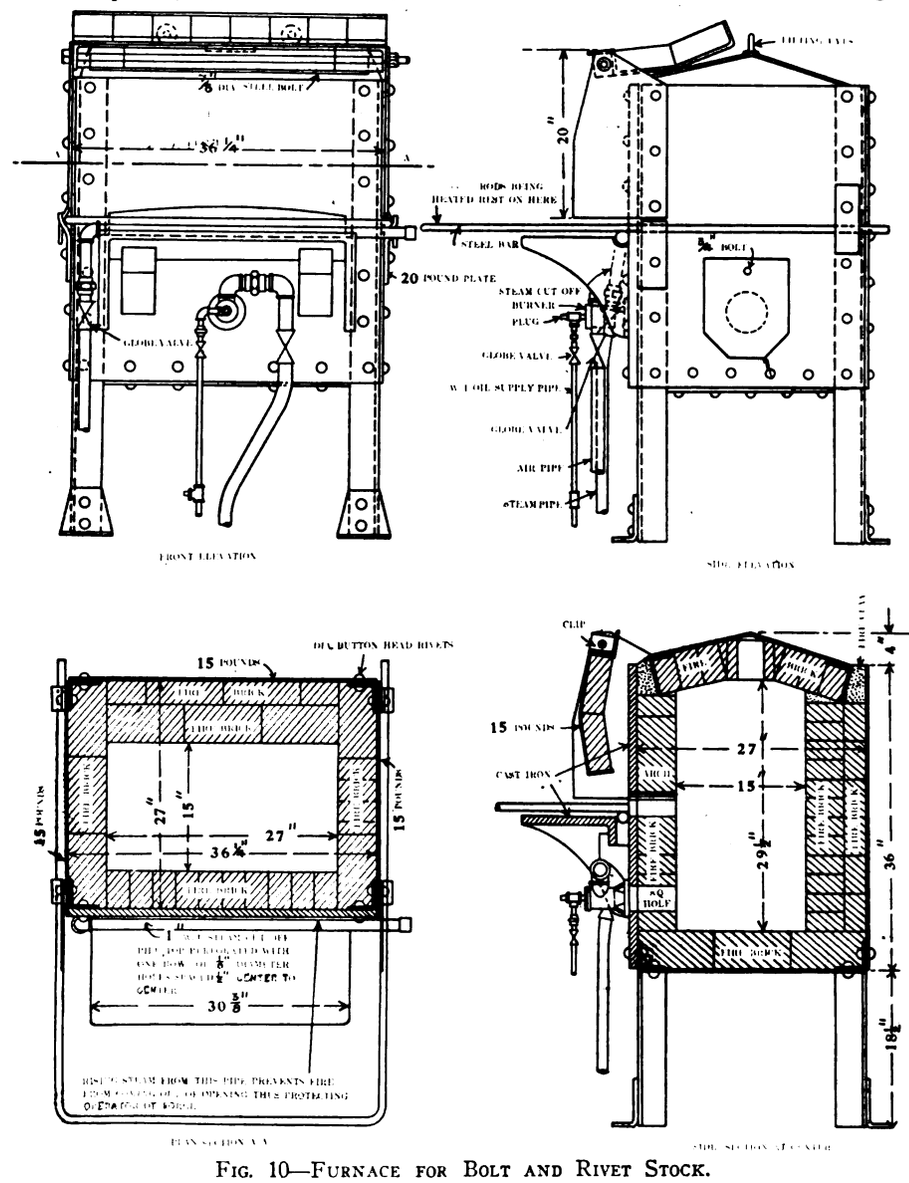

FIG. 10—FURNACE FOR BOLT AND RIVET STOCK.

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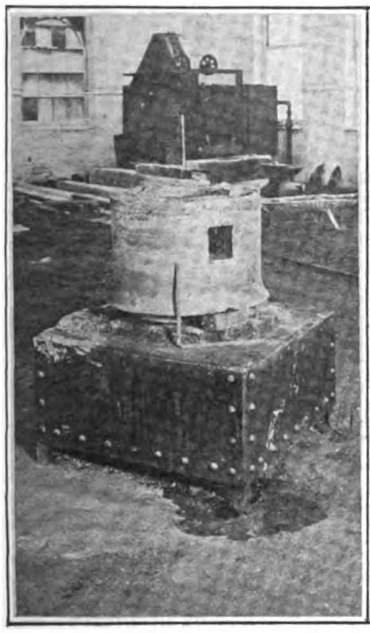

FIG. 11—CASTING ON FORGE BEFORE BRICKING UP.

FIG. 12—THE CASTING BRICKED UP AND HEAT IN PROGRESS.

FIG. 13—CASTING TAKEN FROM FORGE AT WHITE HEAT, READY FOR HAMMER.

taking a small forge and loosely building with fire brick a chamber around the work. This is shown in Figs. 11, 12, 13, 14 and 15. Fig. 11 shows a manganese bronze riser weighing 1,280 pounds, from the foundry, and which it is desired to break up, placed on a small forge. Fig. 12 shows how the chamber is built around the riser with loose brick, and the heat in progress, while Fig. 13 shows the riser at a white heat, ready to go under the hammer. In 40 minutes after the fire was started the top of the riser was at a melting heat. The oil was then shut off for 20 minutes to allow the heat to draw uniformly over the whole area. The oil was then turned on for 18 minutes, at the end of which time the whole of the riser was at a white heat and melting at the outer surfaces.

General Arrangement of Shop.

The general arrangement of the shop, location of tools, cranes, etc., are shown in Fig. 1 and the accompanying photographs. The shop organization provides for the following sub-departments:

1. Miscellaneous small work.
2. Heavy forge work.
3. Bolt machine department.
4. Drop forge department.
5. Tool dressing and tempering department.

The forges, furnaces, hammers, cranes and other facilities are grouped as far as possible to bring the work of each of the divisions named together.

The shop is entered at two points by a standard gage railway track as shown in Fig. 1, and all heavy material is handled to and from the shop on cars served by the shop cranes. The tracks pass immediately adjacent to the east end of the north wing of the shop, from which light work is shipped. All transportation to and from other shops and the storehouse is by means of the yard railway service. Transportation inside of the shop is by means of electric jib cranes and industrial railway tracks which serve the shop and material yard.

The arrangement of the office, storeroom, washroom, lunch room and water closet is shown in Figs. 1, 16 and

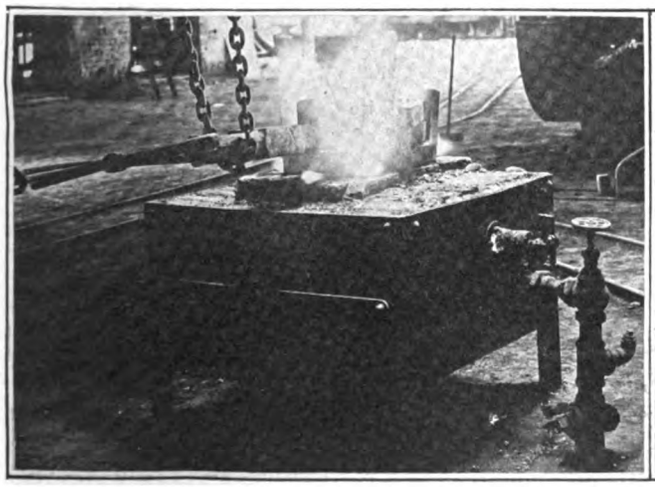

FIG. 14—HEARTH BRICKED UP TAKING HEAT IN END OF CRANK SHAFT.

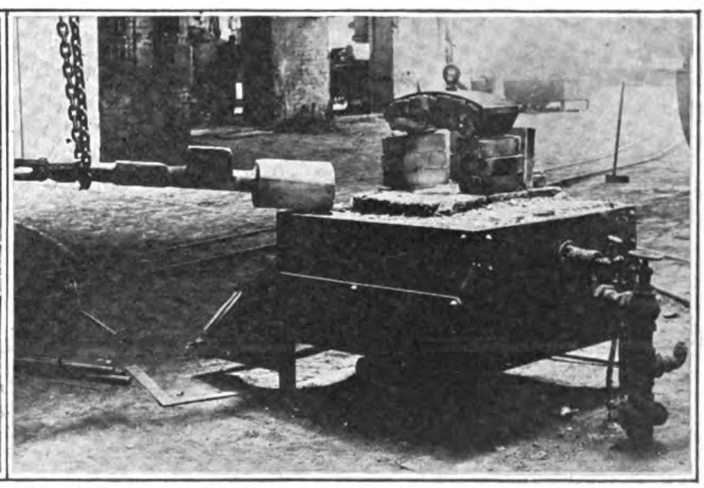

FIG. 15—SHAFT END WITH FORGING HEAT, BLAST SHUT OFF. HEATED END 8 INCHES DIAMETER, 11 INCHES LONG.

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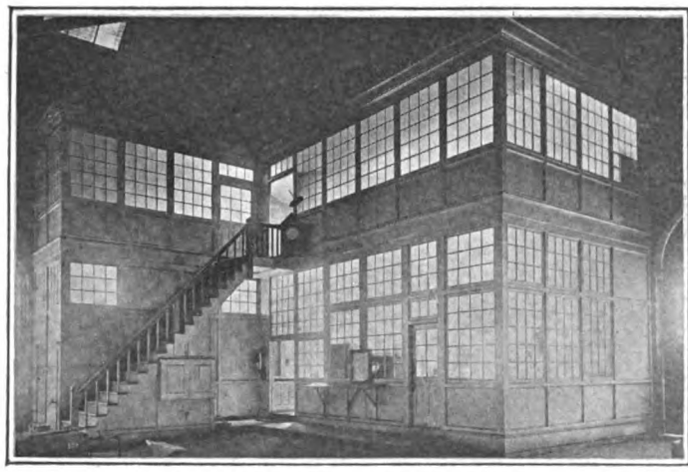

FIG. 16—SMITH SHOP OFFICE, TOOL ROOM, LUNCH ROOM, LAVATORY AND WATER CLOSETS.

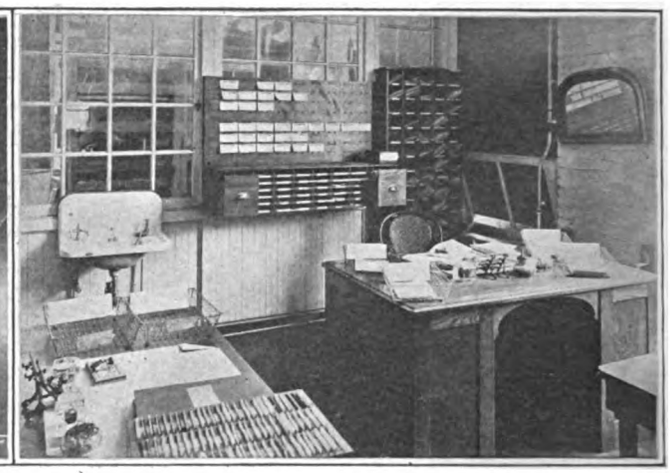

FIG. 17—FOREMAN'S OFFICE.

17. Very few blacksmith shops are provided with facilities for the comfort of the workmen. In machine shops elaborate washing facilities are usually provided for the men, while in blacksmith shops, where they are more needed, they are seldom found. In the arrangement shown the necessary office space, lavatory arrangements, etc., are provided at a minimum cost in space.

(To be continued.)

Liverpool's New Dock Scheme

The Mersey Docks and Harbor Board on July 7 decided to construct the following new works, which are estimated to cost $2,500,000:

A dock about 1,020 ft. long, in a position immediately north of the Rimrose river wall, Seaforth, having an entrance 120 ft. wide, and a sill laid at a level of 25 ft. below old dock sill, and so constructed as to be available when specially required as a graving dock, the floor being laid in concrete at a level of 29 ft. below old dock sill, with a center line of keel blocks and side lines of blocks where necessary; pumping machinery, entrance to caisson, capstans, etc.

A single story shed 900 ft. long and 100 ft. wide, on the north quay of the said dock, with the necessary paving, roadway, railway sidings, etc.

Four movable cargo cranes on the north quay with a range of travel of the full length of the shed.

The necessary embankments and pierheads and dolphins of timber, to form an entrance channel 400 ft. wide at its mouth, leading to the dock.

The deepening, by dredging, to a depth of 27 ft. below old dock sill of the entrance channel and the adjacent portion of the river bed and foreshore.

These new dockworks are really additional to the Gladstone system of new docks already authorized, which also being designed to accommodate vessels of 1,000 ft. in length, and estimated to cost $17,500,000, will be built as soon as the British shipping trade regains its wonted prosperity. As, however, it has been made clear within the last year or two that the future of the New York trade lies not with the 10,000-ton cargo boat, but with the 40,000 or 50,000-ton combined passenger and cargo steamer, and that ships of this type and size are already under construction or contemplated, the Mersey docks board deemed it advisable to take proper steps for the proper accommodation of such steamers before it is too late. It has, therefore, been decided to make a beginning with the construction of one dock at present for these mammoth vessels, and this new dock will be remarkable for one of such huge dimensions in that it will be so constructed as to enable it to be used also as a graving dock for the largest liners. The dock, as before stated, will have a total length of 1,020 ft., an entrance width of 120 ft., will dock vessels 1,000 ft. long and of 50,000 tons, while the depth of water on the sill at the lowest tide will be 35 ft., and on the highest tide 46 ft. 6 in.

The length and tonnage of the biggest liners now afloat compare as follows with those building and contemplated:

	Tonnage.	Length, ft.
White Star, Celtic	20,904	680 9
White Star, Cedric	21,035	680 9
White Star, Baltic	23,876	709.2
White Star, Adriatic	24,541	709.2
Cunard, Lusitania	31,550	762.2
Cunard, Mauretania	31,938	762.2
White Star Olympic and Titanic (under construction).	45,000	860
Cunard (reported as contemplated)	50,000	1,000 (probably)

It is intended to have the dock ready for commission in three years.

Lloyds Rules for Internal Combustion Engines for Marine Purposes

Lloyds register of British and Foreign shipping are about to issue rules for internal combustion engines for marine purposes. These have just been adopted by the committee of the society. They will greatly simplify the registration of the increasing number of vessels fitted with oil engines, particularly launches. The rules are divided under four headings. The section concerning construction strongly enforces the importance of accessibility for examination and repair, and requires that engines of over 60 brake horsepower, which are not reversible, and are maneuvered by clutch, must be fitted with a governor or other arrangement to prevent the racing of the engine when declutched. The cylinders, it is also indicated, are to be tested by hydraulic pressure to twice the water-jackets of the cylinders to the working pressure to which they will be subjected, the water-jackets of the cylinders to 50 lb. per sq. in., and the exhaust-pipes and silencers to 100 lb. per sq. in. In regard to the size of crank, intermediate, and other shafts, formulae and tables are given for ordinary mild steel; where special steel is employed, the sizes are to be submitted for consideration. The tables are comprehensive, embracing smooth-water and open sea service boats, and engines of 4-stroke cycle and 2-stroke cycle. Regarding the fuel tanks and connections—another of the sub-headings—it is pointed out that the separate fuel tanks are to be tested, with all fittings, to a head of at least 15

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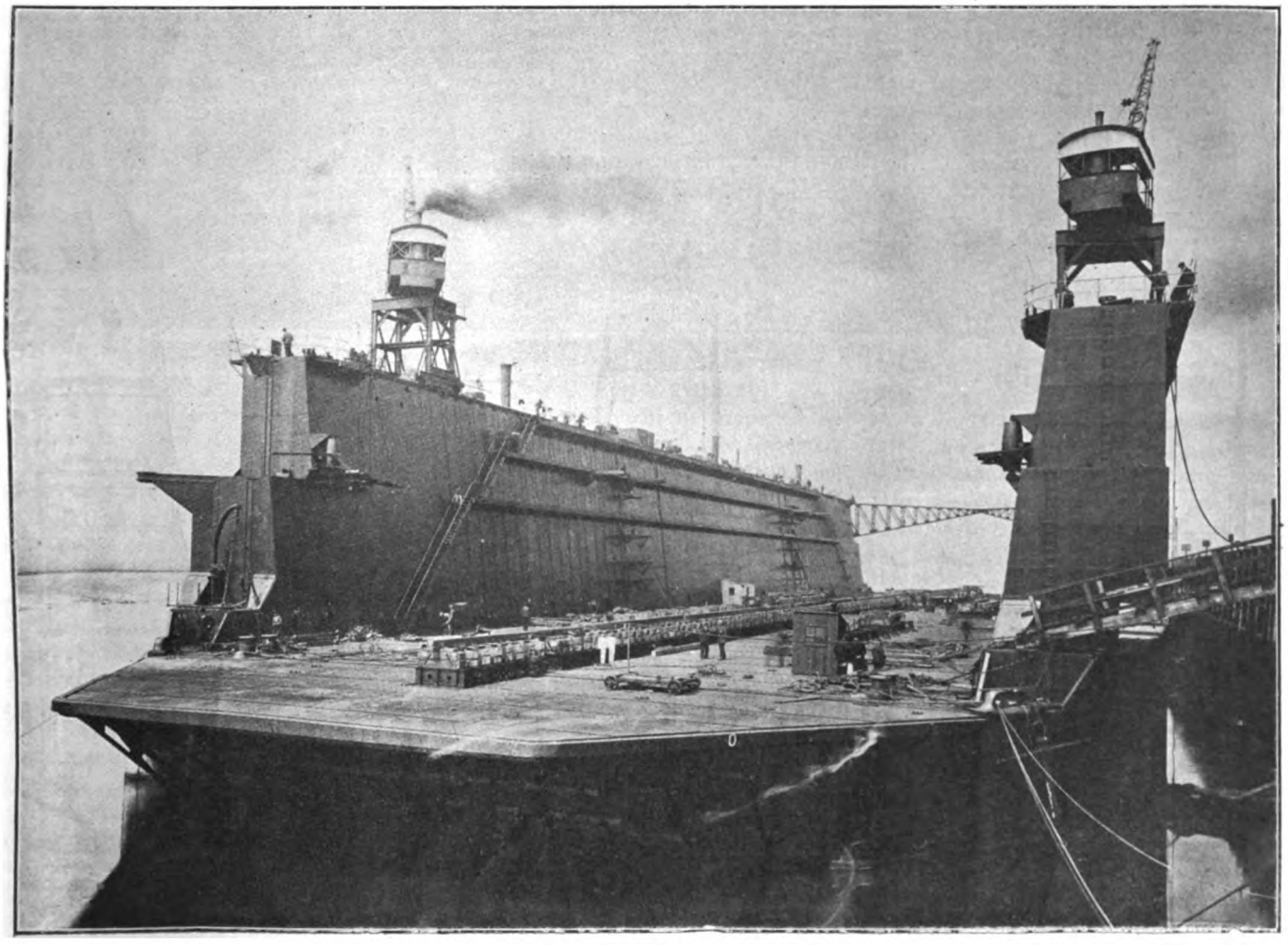
ft. of water. The oil fuel pipes are to be of annealed seamless copper with flexible bends, conical joints metal to metal, with a cock or valve at each end of the pipe conveying the fuel from the tank to the carburetor or vaporizers. The machinery is to be submitted for survey annually, and practically all parts are to be examined, the fuel tanks and all connections being, if deemed necessary by the surveyor, tested to the same pressure as when new. The screw-shaft is to be drawn at intervals of not more than two years.

TWENTY-TWO THOUSAND-TON FLOATING DOCK FOR BRAZIL

THE floating dock having a lifting power of 22,000 tons, built by Messrs. Vickers Sons & Maxim, of Barrow, for the Brazilian government, began her long voyage in tow of two tugs to Rio de Janeiro, a distance of nearly 6,000 miles, on July 14. This floating dock is primarily intended for the accommodation of the three new Brazilian battleships of the Dreadnought type, which have recently been built in British yards. The structure will serve the purpose of a much more expensive graving dock at Rio de Janerio, and has been built in a fifth or sixth of the time that would have been required to construct a masonry graving dock. In inviting tenders and designs for this dock, the Brazilian government simply specified that the dock should be capable, when floating at its moorings in the port of Rio de Janeiro, of lifting and carrying a vessel of a displacement of 19,250 tons, the pontoon, measured at the line of the keel blocks, being 2 ft. above water level. Designs and tenders were submitted by the following eight firms: Cammell, Laird & Co., Birkenhead, £182,500; Vickers Sons & Maxim, Ltd., Barrow-in-Furness, £182,700; Swan, Hunter & Wigham Richardson, Ltd., Wallsend-on-Tyne, £212,500; Gutehoffnungshütte, Oberhausen, Germany, £195,522; Bromberg-Hacker & Co., Bromberg, Germany, £211,200; Societé Anonyme des Forges et Chantiers de la Mediterean-nean, Toulon, £262,326; Blohm and Voss, Hamburg, £302,022; and Maryland Steel Co., Sparrow's Point, Maryland, U. S. A., £369,181. Messrs. Vickers Sons & Maxim, Ltd., were given the contract, being able to give delivery in eleven months, as against twelve months by Messrs. Cammell, Laird & Co., Ltd., whose tender was the lowest. Taking £182,700 as the cost of the dock complete, this works out at under £8 10s per ton of lifting capacity, or about £7 10s per ton, exclusive of cost of towage to Rio de Janeiro.

The dock is of the Clark and Stand-



FLOATING DOCK FOR BRAZIL OF 22,000 TONS.

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field self-docking design, and the following are some of the leading dimensions:

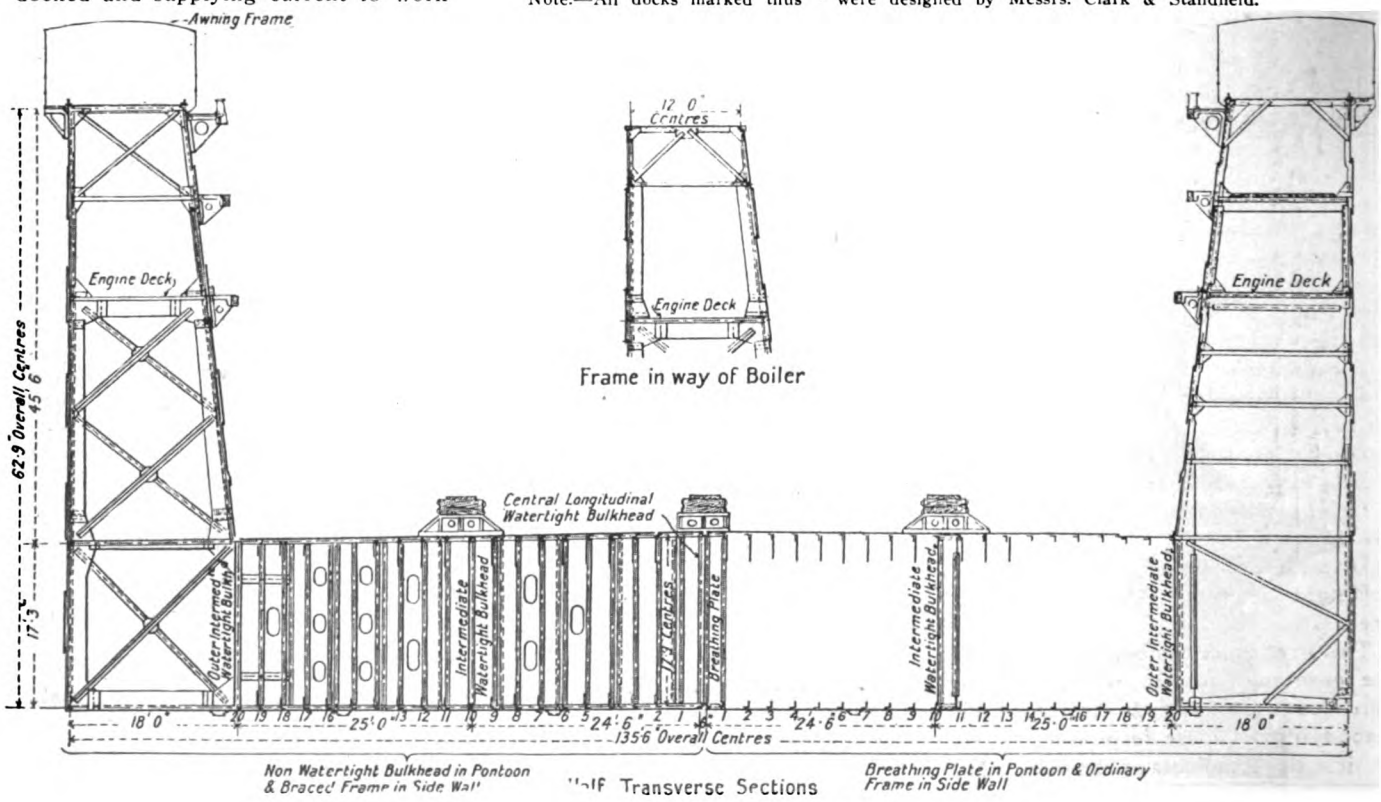
	Ft.	In.
Overall length of dock over 25 ft. platform	550	6
Overall length of dock over pontoons	500	6½
Overall length central section	165	3
Overall length each end section	167	7¾
Overall width of dock	136	0⅝
Overall depth of pontoon at center	18	3¾
Overall depth of pontoon at foot of walls	17	9¾
Overall length of side walls, including docking lands	450	6
Overall height of side walls above pontoon dock	45	6
Overall height of side walls and pontoon	63	3⅝
Overall width of side walls at base	18	0⅝
Overall width of side walls at top	12	6½
Clear width	100	
Maximum draught of vessel	30	
Height of keel blocks	4	
Depth of water required to dock vessel of 30 ft. draught, including 6 in. for troughs and 5 in. clearance	53	3
Freeboard of side walls	10	6

The dock is built in three sections and is extensively sub-divided, but the flooding or pumping out of the compartments is operated from one central house, situated in the starboard wall. The Westinghouse electro-pneumatic system is adopted for operating the valves, and there is an indicator to show the level of the water in each compartment. There are three powerful pumps in each well, connected to two continuous main drains extending the whole length of the dock, and any one of these pumps can be used alone to empty its own half of the dock. The boilers, engines, and dynamos are placed on a 'tween deck 20 ft. below the top deck. There are seven boilers, six steam pumps for fire and wash-down service, and two dynamos for lighting the vessel to be docked and supplying current to work the fans, motors, etc. A distilling plant has been provided to supply fresh water for 750 officers and men, and cooking and sanitary arrangements, electric ventilating fans, etc., have also been installed. A gangway at one end of the dock connects the two walls, and two traveling steam cranes, each capable of lifting five tons, have been fitted, one on each wall. The three sections were launched on the 7th, 8th and 9th of June, and afterwards bolted together at a special berth. The floating dock is being towed to Rio de Janeiro by two powerful Dutch tugs, the ropes being used for towing purposes being no less than 18 in. thick, and they will pay out 170 fathoms between the tugs and the dock. The cost of towage it is said will be £18,000, and the dock is due at her destination early in September.

The following is a list of graving docks of over 10,000 tons lifting power, built or now under construction:

Port.	Date of completion.	Builders.	Lifting power. Tons.	Dimensions: Overall length. Ft. In.	Clear breadth. Ft. In.	Maximum draught of ship. Ft. In.
*Havana (now at Pensacola)	1897	C. S. Swan & Hunter, Ltd.	12,000	450 0	82 0	27 0
*Hamburg (Vulcan I)	1897	C. S. Swan & Hunter, Ltd.	11,500	510 0	82 0	24 0
Hamburg (Blohm and Voss)	1897	Blohm & Voss, Hamburg	17,500	560 0	88 0	32 0
Brooklyn, U. S. A.	1900	Morse Iron Works	10,000	466 0	92 0	26 0
Hoboken	1901	Augsburg Co.	10,000	466 0	92 0	26 0
*Algiers, U. S. A.	1902	Maryland Steel Co.	18,000	525 0	100 0	28 0
*Bermuda	1902	C. S. Swan & Hunter, Ltd.	17,500	545 0	99 0	33 0
*Hamburg (Reiherstieg II)	1903	Flensburg Ship Building Co.	11,000	507 6	76 0	22 0
Hamburg (Blohm and Voss)	1903	Blohm & Voss	17,500	590 0	111 0	29 0
Rotterdam	1904	Swan, Hunter, and Wigham Richardson, Ltd.	15,600	588 0	90 0	25 0
*Pola I	1904	Government Arsenal, Pola	15,000	460 10	84 6	33 0
*Bremen	1906	Actiengesellschaft "Weser," Bremen	10,500	385 0	77 6	23 0
Cavite (Philippine Islands)	1906	Maryland Steel Co.	18,500	500 0	82 6	37 6
Tsing-tan	1908	Augsburg Co.	16,000	410 0	98 0	36 0
*Kobe II	1909	Mitsu Bishi Co.	12,000	532 6	70 0	26 0
Hamburg (Blohm and Voss)	1909	Blohm & Voss	35,500	590 0	111 0	29 0
*Rio de Janeiro	1910	Vickers, Sons & Maxim, Ltd.	22,000	550 6	100 0	30 0
*Hamburg (Vulcan II)	Building	"Vulcan" Co.	35,000	723 9	108 6	32 10
*Pola II	Building	Government Arsenal, Pola	32,500	586 0	111 6	37 0
*Amsterdam II	Building	Nederlandsche Scheepsbouw, Moatschappiz	12,000	459 6	76 0	20 0
*Portsmouth	Building	Cammell, Laird & Co., Ltd.	32,000	680 0	113 0	36 0
*Sheerness	Building	Swan, Hunter, and Wigham Richardson, Ltd.	32,000	680 0	113 0	36 0
Kiel	Building	Howaldtswerke, Kiel	40,000	656 0	141 0	35 3

Note.—All docks marked thus * were designed by Messrs. Clark & Standfield.



CROSS SECTION OF DOCK

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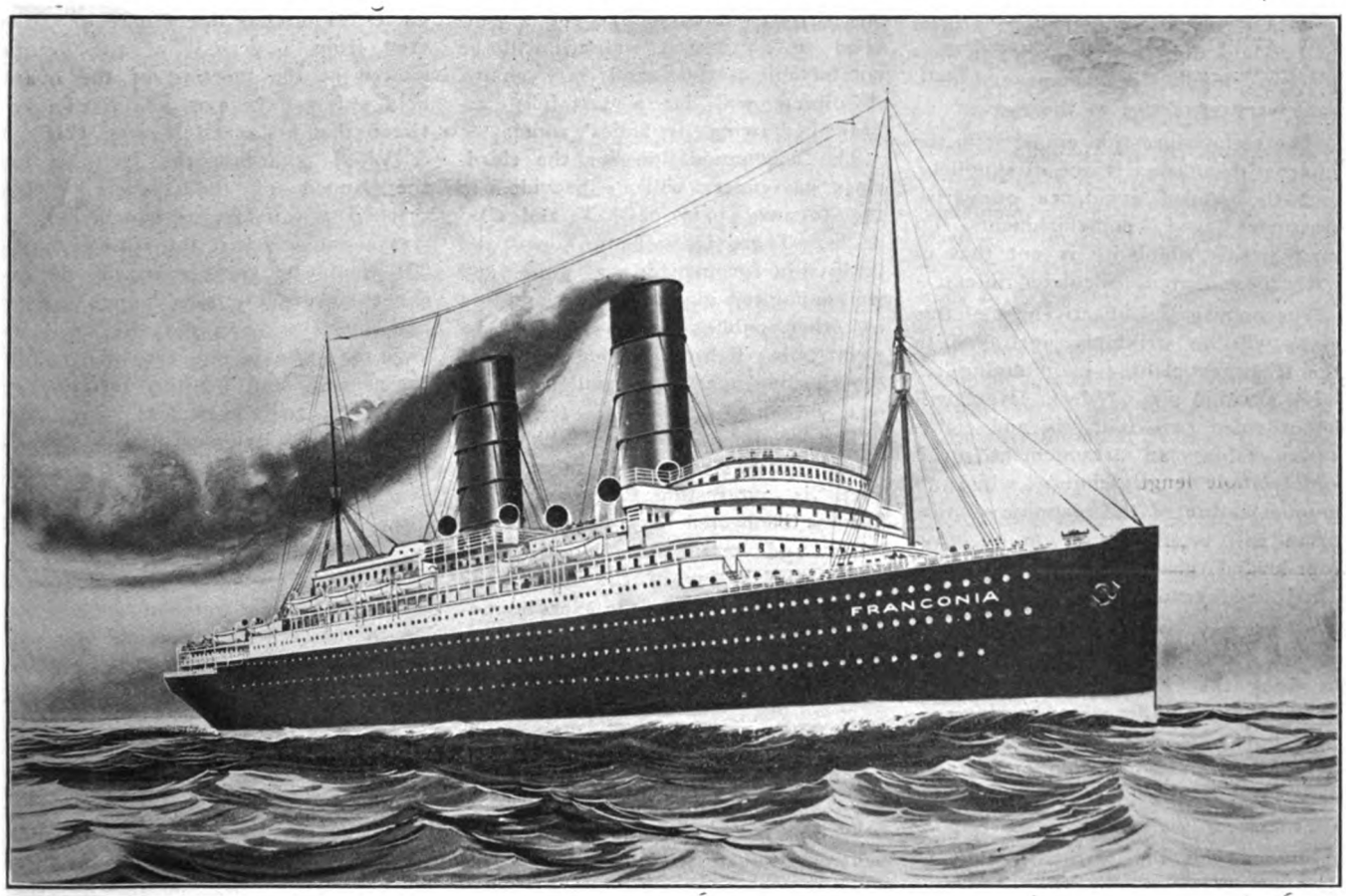
CUNARD LINER FRANCONIA

THE Cunard liner Franconia, intended for Boston service, was launched from the ship yard of Swan, Hunter & Wigham Richardson, Wallsend - on - Tyne, July 23. While smaller than the Lusitania and Mauretania, she will nevertheless be the largest vessel entering Boston harbor.



NEW CUNARD LINER, FRANCONIA.

The principal measurements of the Franconia are:—

Length over all, 625 ft.

Breadth over all, 72 ft.

Depth from top of houses to keel, 90 ft.

Gross tonnage, 18,000 tons.

Displacement, 25,000 tons.

Height of funnels, 140 ft. above lowest furnace bars.

Diameter of funnels, 17 ft. 6 in.

Height of masts, 200 ft. above the keel.

The Franconia has been designed on the graceful lines for which the Cunard boats are noted, at the same time embodying all those features necessary to insure steadiness and seaworthiness in all kinds of weather. In all, there will be no less than seven steel decks.

She is fitted with bilge keels for resisting rolling when in a seaway. Water-tight transverse bulkheads divide the ship into a number of water-tight compartments, thus securing, as far as possible, her unsinkability should the bottom by any means be pierced.

The Franconia will be propelled by twin-screw engines of the inverted, direct-acting, quadruple-expansion type, balanced on the Yarrow, Schlick and Tweedy system, having four cranks to each set.

There will be four cylinders to each set of engines, namely, one H. P., one first M. P., one second M. P., and one L. P., approximately the diameters will be as follows:—33 in., 47 in., 67 in. and 95 in. respectively, with a stroke of 60 in.

There will be two manganese bronze four-bladed propellers and several double-ended boilers, with eight furnaces in each boiler. The weight of one boiler, with mountings, etc., and full of water, is about 215 tons.

An efficient system of mechanical and natural ventilation will be provided in the engine and boiler rooms, consisting of a large number of electrically-driven fans, each capable of delivering 800 cu. ft. of air per minute.

The stokeholds are large and airy, precaution having been taken for the provision of fresh air to all parts.

A suitable workshop has been provided for the engineers, with a large lathe and a universal drilling machine.

Two atmospheric silent hoists are fitted in each of the boilerrooms, also a Stone-Lloyd expeller which forces the ashes through the bottom of the ship.

There are two funnels, one for each group of boilers.

Provision has been made for carrying about 1,500 tons of fresh water on board, and, in addition, two distillers are installed, which produce 90 tons of pure drinking water per day, should it be required.

The Franconia will be equipped with the Marconi wireless system and submarine signalling apparatus.

The decoration is of special interest, because of the effort which has been

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made to secure that it shall be congruous throughout, and in various manners adhere closely to the style of one particular period.

The period adopted by the architects, Messrs. Willink & Thicknesse, of Liverpool, is that when the American settlements were colonies of Great Britain, and the style that is known in America as "Colonial," and in Great Britain as "Georgian." It is a style classic in its fundamental principles, but with features which, though they often disregard and throw aside the strict rules of Palladio and Vitruvius, offer in their place a singular refinement and delicacy very attractive to the eye.

The main impression aimed at in the internal decoration is one of simplicty, and the studed avoidance of garish ornament and embellishment. Of course, this simplicity is not that of barrenness, but of calculated intent.

The dignity and effectiveness of this style will be strikingly portrayed in the treatment of the main dining saloon, situated on "C" deck. Here will be provided two, four, six and eight-seated tables, an arrangement much appreciated by passengers, while an unique feature of the planning of this room will be the provision of loose four-legged chairs in place of the usual fixed revolving seats.

A balcony with a tastefully designed wrought iron balustrading will overlook the saloon, and above will be an elegantly decorated ceiling. A bandstand for one of the famous string orchestras provided on all Cunard liners will be situated at the after end of the balcony.

Forward on the starboard side of the "C" deck will be the children's dining saloon, appropriately furnished and fitted with small tables, while abaft the main saloon will be the kitchens and sculleries complete with the most up-to-date culinary appliances.

On "A". or what is often called the "Boat" deck, will be situated the public rooms other than the dining saloons.

The smoking room will be a most comfortable apartment. The panelling of the walls with harewood of a soft pearl gray shade, will be relieved by inlays of kingwood, while lounges of the most comfortable description will be arranged round the room.

Adjoining the smoking room will be the verandah cafe, an ideal spot for taking light refreshment in the full enjoyment of the gentle breezes and invigorating air.

The staterooms, of which there are to be a large number, will be spacious apartments, and fitted to meet every requirement in the way of comfort and convenience. Each has accommodation for two passengers, for both of whom lower berths are provided.

Equal care and thought has been devoted to the arrangement of the second class accommodation on "C" and "D" decks.

The dining saloon, modeled somewhat on the lines of the first class, will have seating accommodation for 300. In the large smoke room, panelled in Circassian walnut, will be comfortable settees and easy chairs. Adjoining will be a tastefully arranged drawing or ladies' room.

The accommodation for the third-class passengers will be provided in the forward part of "C" and "D" decks. There is to be an open and covered-in promenade, a large and well-appointed dining hall, in addition to other public rooms. It will be electrically lighted throughout, and the sleeping apartments will be spacious and airy.

The origin of the name, like that of the other steamers of the Cunard fleet, is interesting. Franconia, a loosely connected aggregate of districts and territories lying chiefly within the basins of the Rhine, the Main and the Neckar, the exact boundaries of which have been varied at different periods of history.

The Next Cunarder

Interviewed with regard to his statement at the launching of the Franconia that he believed the Cunard Co. had determined to build the largest steamer not only ever built, but ever thought of, G. B. Hunter, of Messrs. Swan, Hunter & Wigham Richardson, told a press representative that he was not at liberty to mention the proposed dimensions of the new vessel. Indeed, he said, they had not yet been definitely decided upon; they were subject to alteration. But the new Cunarder, he added, would be longer, broader and speedier than the Olympic and the Titanic, the leviathans which Messrs. Harland & Wolff are now constructing for the White Star Co. These two vessels would be 850 ft. long between the perpendiculars, and over 90 ft. broad. They were the biggest now on order in the United Kingdom, but were not quite equal to the dimensions of a steamer now being built for the Hamburg-American line at Hamburg.

The new Cunarder, Mr. Hunter said, would be bigger even than the German vessel. In fact, he expected it would be bigger than anything ever thought of, if the Cunard company's present intentions were carried out. Mr. Hunter added that the vessel would in all probability be propelled by turbine machinery.

Launching the Olympic and Titanic

Some idea of the cost to the Belfast harbor board of the launch of the two giant White Star liners may be gathered from a perusal of the figures quoted at the meeting of the board held a few days ago, negotiation between that body and Messrs. Harland & Wolff regarding the facilities for the launch of the vessels having reached a satisfactory conclusion. It was announced that the sum of $300,000 would be spent primarily in order to insure the safe launch of the new liners. When the ship builders gave the ordinary notice to the board's engineering staff for the dredging of the basin to a sufficient depth for floating the Olympic, it was discovered that the line of launch for that ship approached as closely to the Victoria wharf as to endanger its stability. After that difficulty had been satisfactorily disposed of, it was found that the vessels were of such great length that the harbor would not permit of their being turned with safety. The engineer was, therefore, instructed to proceed with the excavation of an embankment at the south end of the west Twin island to facilitate the turning, at an estimated cost of $50,000. The net result was an expenditure of $150,000, but to that sum there must be added $150,000 for the cost of deepening the Victoria channel to a depth of 32 ft. below spring tides. The board is also pledged to two other schemes, more or less connected with the same object, viz., the construction of the embankment on the County Antrim side of the water at a cost of $90,000, and filling in and spreading the ground reclaimed at a cost of $125,000.

Arrangements have been made by the C. W. Hunt Co., New York, builders of coal handling, conveying and hoisting machinery, by which their business on the Pacific coast will be handled by the San Francisco Bridge Co., with offices at 865 Monadnock building, San Francisco. The company has just completed a naval coaling station in San Francisco bay for the government.

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COMPARATIVE BACKING TRIALS

The Result of a Series of Experiments Conducted by the Navy Department on the Scout Cruisers Birmingham, Chester and Salem

IN the beginning of our experience with turbines, attention was naturally centered on their engineering characteristics, such as steam consumption, and details of construction and operation. With the satisfactory development of these elements, we have been able to devote more attention to the tactical features involved, as affecting the ease of handling turbine-engined vessels.

With reciprocating engines a backing power about equal to the ahead power is afforded without any increase in weight, except that of the backing eccentrics, rods and links. With turbines, however, backing power requires additional turbines with a considerable increase in weight.

It is necessary, therefore, to restrict the backing power of naval turbines to that actually required by tactical considerations. The practice has been to provide a backing power estimated at about 50 per cent of the ahead power. It has been found, however, in practice that this backing power is rather less than 40 per cent of the ahead power.

Trials have recently been held with the three scout cruisers to determine the sufficiency of the backing power provided respectively by Parsons and by Curtis turbines, and as compared with that obtained by reciprocating engines. The criterion has been taken as the distance headreached by the vessel during the interval required to bring her dead in the water from a given speed ahead. A general description of these vessels follows. Their hulls are similar.

PRINCIPAL HULL DATA.

Length between perpendiculars, feet	420
Length over all, feet and inches	423—2
Length on L. W. L., feet	420
Breadth, molded, feet and inches	46—8
Breadth, extreme, feet and inches	47—0¾
Ratio of length to beam	8.97
Draught (official contract trial, 3,750 tons displacement), feet and inches	16—9
4,000 tons displacement, feet and inches	17—4½
4,710 tons displacement (about fully loaded), feet and inches	19—2¾
Displacement per inch at mean draught 16 ft. 9 in.), tons	31.07
Area of midship section (3,750 tons displacement), square feet	566
Area of L. W. L. section (3,750 tons displacement), square feet	12,960
Wetted surface section (3,750 tons displacement), square feet	19,900
Coefficient (at 3,750 tons displacement):	
Block	0.40
Midship	0.72
L. W. L. plane	0.66

Machinery Installations.

BIRMINGHAM.

The engines, which turn the propellers outboard, are of the vertical inverted four-cylinder, direct-acting, triple-expansion type, with unjacketed cylinders, placed in two water-tight compartments, and operating twin-screws. Each engine was designed for an indicated horsepower of 8,000 at 200 r. p. m., with a steamchest pressure of 250 lbs. per gage. Beginning forward, the order of the cylinders is, forward L. P., H. P., I. P. and after L. P. The forward L. P. and H. P. cranks are opposite, as are the I. P. and after L. P., the second pair being at right angles with the first. All main valves are of the piston type, worked by double-bar Stevenson links. There is one piston valve for the H. P. and two each for the I. P. and L. P. cylinders.

Cylinders:	
Number for each engine	4
H. P. diameter, inches	28¼
I. P. diameter, inches	45
F. L. P. diameter, inches	62
A. L. P. diameter, inches	62
Diameter of piston rods, inches	6
Stroke of all pistons, inches	36
Propellers:	
Material	Manganese bronze
Number of blades	3
Diameter, feet and inches	12—6
Pitch (as set) mean, feet and inches	15—3
Pitch, adjustable, from feet and inches	14—6 to 16—6
Ratio of diameter to pitch	1.22
Area, projected, square feet	40.8
Area, helicoidal, square feet	49.4
Area, disk, square feet	122.7

CHESTER.

The propelling machinery of the Chester, designed for a working steam pressure at the turbines of 250 lbs. (gage) and about 507 r. p. m. for the contract speed of 24 knots, consists of Parsons marine steam turbines, driving four independent shafts, each shaft being fitted with one propeller. The installation comprises six ahead turbines in all, two of which—the H. P. and I. P. cruising—are for use at low powers in order to secure economy. There are also two backing turbines, located in each of the L. P. casings, and it is to be observed that this arrangement permits reversal only of the two inboard shafts in maneuvering.

The outboard shafts are operated entirely by main H. P. turbines; the starboard inboard by the L. P. (starboard) turbine and H. P. cruising turbine, and the port inboard by the L. P. (port) turbine, and the I. P. cruising.

Propellers:	
Material	Manganese bronze, cast solid
Number of propellers	4
Number of blades (each propeller)	3
Diameter, feet	6
Pitch, feet	6
Ratio of diameter to pitch	1
Area, projected, square feet	17.02
Area, helicoidal, square feet	19
Area, disk, square feet	28.27

SALEM.

The Salem is driven by outboard turning twin screws, the propelling machinery consisting of two Curtis marine reversible impulse turbines, one on each shaft, designed to develop 8,000 b. h. p., at 350 r. p. m. with 250 lbs. (gage) steam-chest pressure. The machinery is arranged in two water-tight compartments, separated by an athwartship bulkhead, the starboard screw being operated by the forward turbine.

Each turbine has a pitch diameter of rotating wheels of about 120 (center to center of buckets), and for the ahead motion consists of seven stages; each wheel is fitted with three rows of buckets, except in the first stage, which contains four rows. For backing, there are two stages, the wheels or rotors being mounted on the shaft in the same casing as the go-ahead stages.

Propellers:	
Number of blades	3
Diameter, feet and inches	9—6
Pitch, feet and inches	8—8½
Ratio, diameter to pitch	1.09
Area, projected, square feet	36.8
Area, helicoidal, square feet	43.7
Area, disk, square feet	70.9

These trials were conducted with great care and thoroughness, the conditions of displacement, sea, speed, and number of boilers in use, were practically identical for all, and the results may be taken as an authoritative indication of the relative backing powers of the three types of machinery as now installed.

The speeds selected for the trials were 10, 16, 22 and 24 knots. Three runs were made by each vessel at each of the two lower speeds, two runs at 22 knots, and one run at the high speed. At each speed only the boilers required for a sustained run at this speed were used.

There was no bottling up of steam preparatory to backing, and no speeding up of blowers during the backing

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interval. It was required that the boiler pressure be not reduced to such an extent as to cause priming.

The results are shown in the following table:

COMPARATIVE BACKING DATA, CHESTER, SALEM AND BIRMINGHAM.

Speed in Knots.			Mean Draught.			Displacement.		
C.	S.	B.	C.	S.	B.	C.	S.	B.
9.85	10.00	10.00	19′ 8″	19′ 8″	19′ 7″	4,950	4,877	4,855
Av. 4 runs	3 runs	3 runs						
15.79	16.00	16.07	19′ 7″	19′ 7″	19′ 7″	4,842	4,846	4,851
Av. 3 runs	3 runs	3 runs						
22.09	22.00	21.75	19′ 4″	19′ 7″	19′ 6″	4,785	4.846	4,835
Av. 2 runs	2 runs	2 runs						
24.25	24.00	23.40	19′ 4″	19′ 7″	19′ 6″	4,785	4,846	4,832
1 run	1 run	1 run						

Time to stop from instant of signal for reversal.			Distance head reached in ship lengths.		
C.	S.	B.	C.	S.	B.
M. S.	M. S.	M. S.			
1:52.7	1:20.4	1:10.3	2.2	1.8	1.5
2:06	1:27.3	1:21.2	4.3	3.0	2.6
2:08.5	1:37	1:03	5.4	4.2	3.0
2:51	1:40.5	1:09	6.5	4.7	3.2

It will be noted that at all speeds the reciprocating engine provides better backing power than the Curtis turbines, and that the latter is superior to the Parsons turbine.

The average time required for reversing, and the fall in boiler pressure during the backing interval were as follows:

	Av. time to reverse, in secs.	Av. drop in boiler pressure, lbs.
Parsons turbines	8.2	82.4
Curtis turbines	39.2	75.8
Reciprocating engines..	5.1	None

In the case of the Birmingham, the average boiler pressure at the end of the backing interval was 1.5 lbs. greater than at the beginning of the interval.

The Shutung's First Voyage

The maiden voyage of the Shutung, a twin-screw tug, built by Messrs. John I. Thornycroft & Co., for the navigation of the Yangtse rapids, has created quite a sensation in the Chinese press, the vessel having towed a passenger and cargo flat of approximately her own dimensions, built by the same firm, up the rapids between Ichang and Chungking in one-third of the shortest time hitherto required for the journey.

Below are given extracts from the report as it appeared in the *North China Daily News.*

"We have just witnessed a scene of intense excitement and rejoicing over the safe arrival of the Szechuan Steam Navigation Co.'s steamer Shutung from Ichang. The difficulties, which were legion, including the opposition of the Viceroy in Hupeh, have been patiently overcome, and the Shutung reached Chungking safely. The powerful little steamer, only 115 ft. long and 15 ft. beam, made the journey of 500 miles against a fall in that distance estimated at 500 ft., without a hitch of any sort. Her tow of the same length but with 1 ft. more of beam, carrying 50 tons of cargo and about three score of passengers, was firmly lashed alongside, her bow projecting about 10 ft. ahead of the steamer's bow. Like Siamese twins—the two practically one—they (or she) came all the way under the Shutung's own steam. It was not found necessary at any of the rapids to separate them and haul up the tow by a hawser.

"As the river still keeps high, the Ching and the Hsinloong rapids were in their easy condition. The Yaochaho, that 14-mile stretch of rocky wilderness between the Ichang and Niukanmafel gorges, gave a good deal of trouble, especially off the Peitungtze and Tutan rapids, where considerable seas were shipped over the fore decks. The Yehtan also gave trouble. Twice the force of the current and the slope of the rapid were too much for the then pressure of steam and the twin ships drifted backward. After cleaning the fires, another attempt was made, and this time successfully.

"All the other difficult places were navigated without trouble, except the Futan, a little above Wanhsien. Here a rise of water had brought the river to danger level for that rapid, the perpendicular rock wall on the left bank being awash. For a few moments it was 'touch and go.' But at the right moment the call for another pound or two of pressure was promptly responded to by Chief Engineer Brandt, and the 'Twins' just managed to weather the point.

"Chungking is practically three weeks to a month distant from Ichang by junk for passengers and from a month to two or even three months for cargo. The Shutung has made her first trip up against a strong autumn current in 65 (steaming) hours. She should make the down trip to Ichang in less than half that time.

"If such a successful journey can be made on a first and trial trip, how much we may look for when every hand is a tried and experienced one. The vessel has proved a great success, and she received a great ovation."

In writing of this first performance, Capt. Plant (the marine superintendent of the Szechuan Steam Navigation Co.) gives one or two interesting details. The following is an extract from his letter:

"The tugboat Shutung with her flat made the maiden voyage through the rapids and gorges to Chungking in perfect safety during the latter days of last month. The little vessels maneuvered admirably all through the turbulent swirling waters—the flat towing alongside—and reached Chungking in seven days from Ichang, a distance of 400 miles, that has occupied from 30 to 50 days by native craft.

"We experienced no trouble at all with the engines throughout the whole journey, though the strain on them at times must have been severe on account of the racing of the propellers in the violent swirls below the rapids. We kept 140 lbs. pressure easily and constant, with the local coal, and engines working at 300 revolutions; but we found some difficulty to keep pressure when the engines were opened full out at the crossing of the rapids, that is with 325 to 340 revolutions.

"We experienced no trouble whatever with our boiler or auxiliary engines, and found no difficulty in keeping a good water level in our boiler. We hardly ever used the fan engine; the natural draught was quite sufficient. We averaged a mean of 6 knots over the ground throughout."

Terminal at Port Lobos

The Robbins-Ripley Co., engineers and contractors, 50 Church street, New York, have just completed plans for the deep sea terminal of the Arizona, Mexico & Gulf of California railroad at Port Lobos, Mexico. The terminal consists of a trestle approach 2,500 ft. long, a pier partially shedded, 500 ft. long, with a sufficient depth of water to take care of the largest sea-going vessels.

The Ripley combination piling is to be used throughout the entire structure for the prevention of the ravages of the toredo, which infest the waters of the gulf of California. It is expected that after the completion of the Panama canal that Port Lobos will become an important outlet of products, mineral and otherwise, of Arizona and New Mexico.

The New York Ship Building Co., Camden, N. J., announces that Edwin B. Sadtler has been appointed agent in charge of its New York office, No. 12 Broadway.

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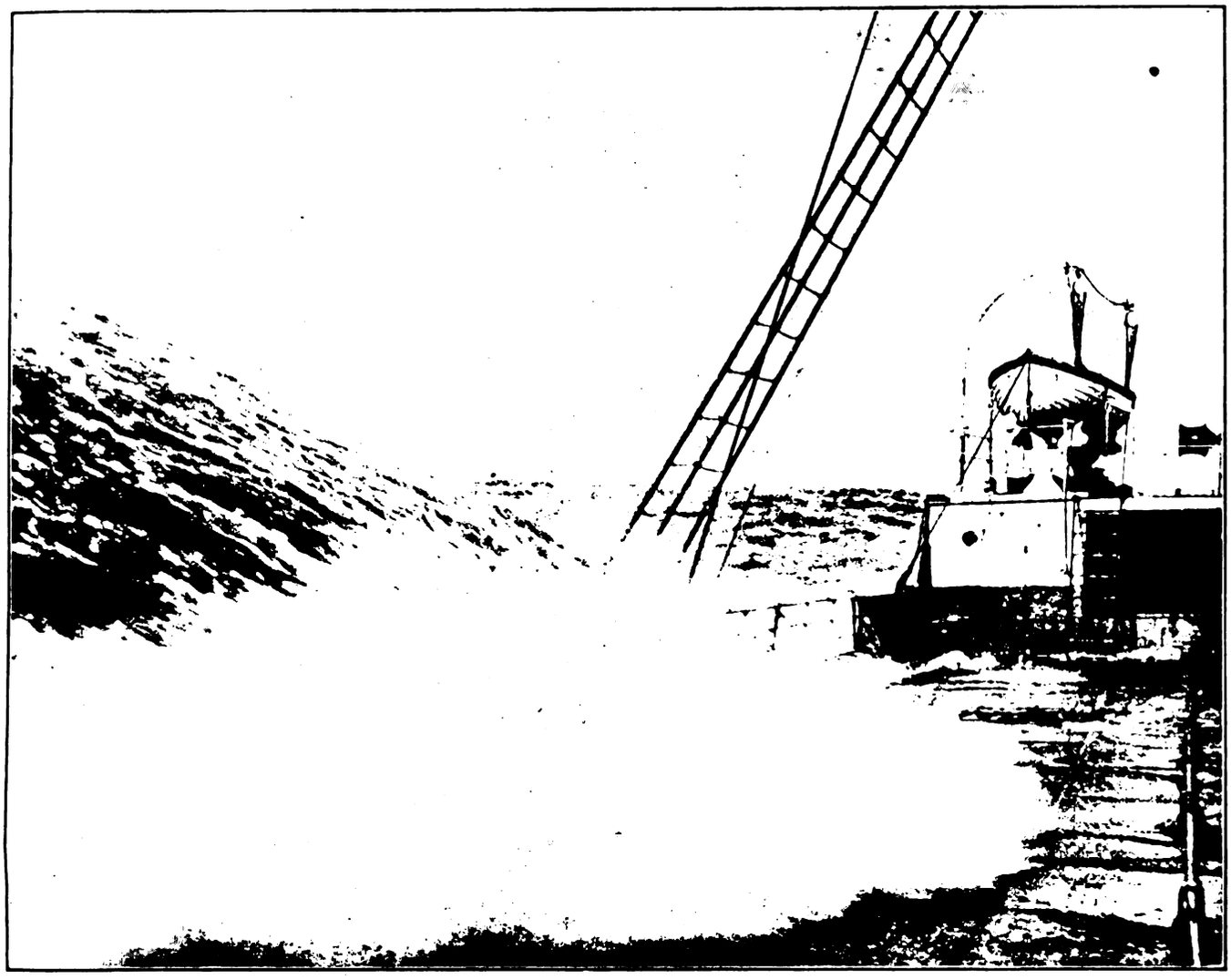

THIS REMARKABLE PHOTOGRAPH OF A SEA BOARDING A VESSEL WAS TAKEN ON THE STEAMER CRASTER HALL IN THE MEDITERRANEAN. THE PHOTOGRAPH WAS A SMALL KODAK FILM, TAKEN FROM THE SPAR DECK AFT, LOOKING FORWARD.

Kingston Ship Building Co.

THE operations which have been carried on during the last three months at the government dry dock, in Kingston, should be of special moment to the shipping interests on the great lakes. Hitherto vessels, which have had occasion to go into dry dock for repairs, have lost considerable time on account of the lack of a properly equipped plant in connection with the dock, and the Dominion government, having realized the handicap under which it was laboring, decided lately to lease the property, for which the Kingston Ship Building Co. has been the successful tenderer.

In accordance with the terms of the lease, the company was to establish a ship building and repair plant and, although they only entered into possession of the dock on May 1 last, the construction work has been rushed through so rapidly that it is now equipped with the most modern appliances to execute ship repairs of all kinds.

The company has just completed the erection of a steel frame building in which all the necessary machinery, hoists, etc., for carrying on ship building and repairs are fitted up; it has reserved the portion of the east side of this building for oil furnaces of the latest type and for bending slabs, and alongside are located the blacksmiths' furnace and fires. The mold loft occupies the whole of the second floor.

In the pump house, which is situated on the east side of the dock, a compound vertical engine capable of developing 100 H. P. has been installed to run the generator which supplies the motive power for the plant, while a prominent feature is the 1,600 cu. ft. air compressor, from which pipe lines are led to the dock and the building berths.

The dry dock, a view of which is shown in the company's advertisement in this issue, is situated near the center of Kingston harbor. It is 323 ft. long, 55 ft. wide at gate, with 16 ft. water over the sill and can accommodate any vessel plying on Lake Ontario, and canal size freighters will doubtless find it to their advantage to have any repairs that may be necessary done at this plant before proceeding up the lakes, especially in the fall of the year.

It is interesting to note that the company has already been successful in securing new construction, the Dominion government having awarded to them the contract for a steamer for the quarantine service at Grosse Isle. This vessel will be 113 ft. 3 in.

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in length over all, and 23-ft. beam, and will have three decks, lower, main and hurricane. It will be of steel construction throughout and will conform to the requirements of Lloyds class 100 A-1. There will be two hospitals, which are to be located in the steel deck house on the main deck on which also provision will be made for the doctor's staterooms and officers' mess room. The captain's and first mate's quarters will be arranged in the texas abaft the wheel house on the hurricane deck and accommodation has been provided below the main deck for the other officers.

The boiler, which is 13 ft. 6 in. diameter by 11 ft., will be of the Scotch marine tubular type with a working pressure of 130 lb., and the engine will be compound surface condensing with cylinders 18 in. and 36 in. diameter by 24-in. stroke, capable of developing 400 H. P.

The company will no doubt make every effort to insure the successful building of this, their first vessel, and make it a credit alike to the owners and the builders. With this end in view they are gathering together a competent staff of workmen, which will also have the further advantage that there will be available a supply of help for any repair work that may be offering, and the chances of undue delay to the ship owners will accordingly be reduced to a minimum.

Speed and Economy

PROF. L. Fontano-Russo, of the Institute for Higher Commercial Studies, at Rome, contributes to the *Revue Economique Internationale* an interesting paper on the "Progress of the Mercantile Marine." Among the points which he discusses is the ever-increasing speed of ocean leviathans as a result of the invention of the turbine, and he is led to ask the question whether the matter of velocity has not, perhaps, gone beyond economic limits. "Steamers of the type of the Lusitania," the writer observes, "must, in view of the enormous cost of running them, travel always with a full complement of passengers and cargo, and demand high rates. This Cunarder can carry 2,150 passengers, but will 2,150 travelers be found each sailing? Vessels of this size and power must be in constant use, as unemployment is more costly for them than a voyage, with only half cargo. Moreover, they cannot, on account of their draught and length, use any port except the large ones The Norddeutscher Lloyd and the Hamburg-American lines, which have given many proofs of great foresight, have made such dispositions that their fleets can find employment in the most diverse directions and enter numerous ports.

"The Hamburg-American line has never been enthusiastic over high speeds. It only possesses one steamer, the Deutschland, whose speed exceeds 20 knots. The dividends which it has distributed have always been higher than those of the Norddeutscher Lloyd, which had and has, however, a faster but not more modern fleet. Between 1900 and 1907, the former company distributed on the average 7.8 per cent, whereas the latter, although subsidized by the government, paid scarcely 5.4 per cent. If this comparison is extended to another company, namely the Cunard, which has always been an advocate of high speeds, it becomes still more favorable to the Hamburg-American line.

"It would seem that the conclusion is that financial success falls to the lot of those companies which advocate moderate speeds while keeping their material up to date, rather than to those which, while possessing modern units, endow them with exaggerated speeds. It would appear that the economic speed—that is to say, the one which is capable of insuring the best financial results—is not the maximum which has actually been attained. Certainly the latter will be surpassed in the future, thanks to the progress of naval technique; but it is necessary that this progress should transform into economic speed that which, at the present day, can only be called extravagant."

Commenting on the above the *Shipping Gazette* (London), says:

An Economist's Views.

Prof. Fontano-Russo's idea of economic speed, as expressed in the article on "The Progress of the Mercantile Marine," is rather a surprise to me. The Italian economist does not insist that in the Mauretania's 26 knots we have reached the limit of speed on the Atlantic. On the contrary, he expresses the belief that "the progress of naval technique" will carry us much further. "But," he says, "it is necessary that this progress should transform into economic speed that which at the present day can only be called extravagant." The average shipbuilder who reads that will very likely smile, because the whole end of his business is to produce vessels that will pay for their speed. But upon what evidence does Prof. Fontano-Russo conclude that the Lusitania and the Mauretania are extravagant boats? He suggests, for one thing, that unless they sail with full complements of passengers they lose money. How does he know that? As a matter of fact the vessels were designed with a margin that enables them to make money on much less than their complements. But, apart from that they must, if it comes to losing, lose less than slower boats, because speed is a proved attraction to voyageurs. Another thing the professor says is that they "must be in constant use, as unemployment is more costly for them than a voyage with only half a cargo." The rejoinder to that is that if they lose more when they are idle they make more when they are working. The professor is not seeing the problem whole.

A Wrong Standard.

Moreover he asserts that "they cannot on account of their draught and length, use any port except the large ones." The answer to that is that they were designed for the New York service, and in respect of their unsuitability for other work are no worse off than the German liners for which Pro. Fontano-Russo seems to have a great affection. Where the professor errs is in assuming that the economy of speed is correctly expressed by dividends. It is obvious, of course, that defects of the administrative machine are the real causes of dividend declines. The controllers of a company may order the wrong kind of boat, may go in for more speed craft than the economy of their business can stand, or may ask a ship builder to embody a design that is rank bad to begin with. But, left alone, ship builders almost invariably produce vessels that pay for their speed. Amongst themselves they may differ as to the solution of a particular problem. The Cunarder with piston engines which Wallsend designed and the Cunarder with turbines which it built are cases in point. Dr. Caird's criticism of the Lusitania and the Mauretania is another. But they are all alternative solutions of the same problem, and the only advantage claimed for any of them is that its degree of economy is higher. The fact is that there is nothing wrong with the economy of the Lusitania and the Mauretania, and if our friends across the North Sea had the money they would outbuild them tomorrow.

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THE AVOIDANCE OF EXCESSIVE ROLLING IN VESSELS ENGAGED IN OCEANIC TRANSPORTATION

AMONG the characteristics of every vessel is the period of time in which she will roll among waves from a given inclination on one side of the upright position to the same inclination on the other side. This is an architectural characteristic which remains fixed under normal conditions of load and trim, but which may be varied within considerable limits by changes in the disposition of weights and the consequent affecting of the vessel's metacentric height and radius of gyration. Fluid resistance operates to limit and tends to extinguish the rolling oscillations of vessels, but whatever the extent of the rolling, within the limit of 15 degrees or 20 degrees from the upright position, the time in which it is performed is practically constant and equal to the period in which a vessel naturally continues to oscillate when she has been artificially set to rolling in still water.

Circumstances of Deepest Rolling

In a manner somewhat analogous to that in which the amplitude of the swinging of a pendulum is increased by regularly timed impulses given in correspondence with the period of its swing, the deepest rolling of a vessel at sea may be expected to take place when she is exposed broadside to waves whose half-period is the same or nearly the same as her still-water period, of rolling. Among equally mariner, holding in mind the period seem almost insensible to their effects.

And so it comes about that the high waves of a different period, she may be comparatively steady and of rolling of his vessel, and having a is quite as important that the vessel knowledge and account of the periods of the waves met with at sea, may derive great advantage in the maneuvering of his vessel. In some branches of oversea transportation, it is quite as important that the vessel be not exposed to unnecessary rolling as it is that the gun platform of a battleship be not unnecessarily unsteady in action.

Transportation Dangers Arising from Excessive Rolling.

In the transportation of coals and explosives, and in all those cases in which the attrition caused by excessive rolling may give rise to ignition, occasions arise when it is highly desirable so to lay the vessel with reference to the progress of the waves that the rolling may not become excessive; and this is also the case in the transportation of live freight and in those voyages, constantly taking place in many trades, which have to be undertaken with little or no cargo on account of the absence of return freights and in which it is necessary, for seaworthiness and proper immersion of the propellers, to sink the vessel by means of water ballast. This has usually been placed in the double-bottom compartments with the result of lowering the center of gravity of the vessel so far as to give a largely increased metacentric height and a consequent shortening of the vessel's period of rolling to such an extent as to bring it into approximate coincidence with the half-period of the particular waves met with on the voyage. A vessel in this condition may readily be laid among the waves by an uninformed mariner so that she is actually unsafe.

Effect of Change of Heading.

While the period of rolling of an individual vessel in a given condition of load is practically a fixed quantity, the periods of the waves that are met with at sea vary between comparatively wide limits, and it is necessary for the purposes of good seamanship that the mariner should be able to find the period of the waves that are running at any given time. If, with a vessel headed in the direction of the wave crests, the half-period of the waves should be found to be the same as the still-water period of rolling, a change of heading to a course passing diagonally across the crests of the waves will effect an alteration in the interval of time between the arrival at the vessel of successive waves, and thus destroy that correspondence between the wave period and the vessel's period of rolling which gives rise to very deep rolling; and it is obvious that, if it should become necessary to destroy this correspondence on a diagonal course, the desired result may be reached by a change of the vessel's speed without changing the course.

Rolling experiments have been made on most classes of warships, and their natural or still-water periods have been determined. For small gunboats, torpedo boats, and small craft, the period for a single roll is from two to three seconds; for the larger gunboats and smaller cruisers the average period is four seconds; and for the larger unarmored cruisers the average period is from five to six seconds, but some of the larger swift cruisers have periods as high as eight seconds. Among the armored ships the shortest periods are found in coast-defense vessels of shallow draught, great proportionate beam, and large metacentric heights. One of the United States monitors was found to have a period of only two and seven-tenths seconds, and some of the French floating batteries have periods of three to four seconds. The earlier types of coast defense battleships have periods of five to six seconds, and the larger seagoing battleships and armored cruisers have periods ranging from seven to nine seconds. Merchant vessels also differ widely in this respect and have natural periods of rolling ranging downward from about fifteen seconds in the great trans-oceanic liners to very much smaller periods in those vessels in which a good metacentric height has been secured, while the radius of gyration has remained necessarily small on account of the small dimensions of the vessel. It is important that rolling experiments should be more commonly performed with merchant vessels, and that mariners should be accorded the benefit of being made conversant with the resulting periods of rolling.

Dimensions and Periods of Sea Waves.

Many observations upon the dimensions of waves at sea have been collated and discussed, and it is found that, in different conditions of the weather and different configurations of the waters of the globe, their periods vary from three or four seconds to fifteen or sixteen seconds. In 1839 the officers of the United States ex-

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ploring expedition made accurate observations upon a regular series of waves in the region of Cape Horn, and found them to have a height of 32 ft., a length of 380 ft., and a period of 8.7 seconds. Dr. William Scoresby made a report to the British association for the advancement of science, in 1850, in which he states the results of the observations of waves made by him in the Atlantic ocean in 1848. The greatest distance from crest to crest observed by Dr. Scoresby was 790 ft., and the average distance 559 ft., and the period or interval of time between waves was 16 seconds. This is also found to be the period of waves in the South Pacific ocean in the average seas that are met with between New Zealand and Cape Horn.

Observations Upon Sea Waves by United States Naval Officers.

A large number of observations, embracing the height, length, and period of ocean waves, have been taken by officers of the United States navy. A selection of them is here tabulated in order to set forth the variations in the observed period:

Name of ocean.	Year of observation.	Force of wind.	State of sea.	Height. Feet.	Wave Length. Feet.	Period. Seconds.
Atlantic	1886	10	Confused.....	25	375	7.5
India	1885	4	...do.....	25	450	11.0
Do	1885	4	...do.....	25	500	13.0
Do	1885	4	...do.....	34	400	12.0
Pacific	1886	2	Long swell...	23	350	10.0
Indian	1885	4	Confused.....	22	400	10.0
Atlantic	1886	8	Regular.....	21	328	8.0
Indian	1885	4	Confused.....	21	400	9.0
Atlantic	1886	7	Regular.....	18	318	7.5
Indian	1885	4	Confused.....	18	300	8.0
Do	1885	4	...do.....	18	250	9.0
Do	1885	4	...do.....	18	400	12.0
Do	1885	4	...do.....	16	350	9.0
Do	1885	1	...do.....	16	350	11.0
Do	1885	4	...do.....	15	200	8.0
Do	1885	4	...do.....	15	150	7.0
Do	1885	4	...do.....	15	300	9.0
Do	1885	4	...do.....	15	250	9.0
Pacific	1886	4	...do.....	12	276	5.0
China Sea	1883	5	...do.....	11	167	6.8
Pacific	1883	8	Irregular.....	10.5	209	6.7
Do	1883	6	Confused.....	8	191	6.1
Do	1886	1	Swell.....	8	400	10.0
Pacific (South)	1883	5	Confused.....	8	249	7.0
Pacific	1885	4	...do.....	8	100	7.0
Pacific (South)	1885	2	Regular.....	7	100	6.0
Do	1885	3	...do.....	6	100	6.0
Pacific	1885	1	...do.....	6	80	5.0
Atlantic	1886	4	...do.....	5	261	7.7
Do	1886	0.1	...do.....	5	314	8.3
Pacific	1885	1	...do.....	5	60	5.0
Caribbean Sea	1887	3	...do.....	4	100	8.0
Pacific	1885	0	...do.....	4	50	5.0
Caribbean Sea	1887	3	...do.....	3	50	4.0
Atlantic	1887	4	...do.....	3	30	3.0
Caribbean Sea	1887	3	...do.....	2	40	4.0

Method of Observing the Lengths, Speeds and Periods of Waves.

These results have been determined from observations that have generally been scientifically made. A method frequently adopted is to station two observers, A and B, as far apart as possible at a known longitudinal distance from each other on the deck of the observing vessel. At each station a pair of battens is erected so as to define, when used as sights, a pair of parallel lines at right angle to the vessel's keel. The observers at both stations being furnished with inter-compared seconds-hand watches, note the instant of time when a wave crest crosses their lines of sight, and they also note how long an interval elapses before the next wave crosses their lines. Comparing their records, they determine (1) the time (say t seconds) occupied by the wave crest in passing over the length (L feet) between their stations; (2) the time (say t_1 seconds) elapsing between the passage of the first and second crest across either line of sight; this time is termed "apparent period" of the waves. Suppose the vessel to be advancing at a speed of V feet per second *toward* the waves, her course making an angle of a degrees with that course which would place her exactly end-on to the waves. Then, expressing the conditions algebraically—

Apparent speed of wave (feet per second) $= \frac{L}{t}$

Real speed of wave (feet per second) $= V_1 = \left(\frac{L}{t} - V\right)\cos a$

Real length of wave (feet) $= (V_1 + V \cos a)t_1 = L \cos a . \frac{t_1}{t}$

Period of wave $= \frac{L \cos a}{V_1} . \frac{t_1}{t} = \frac{Lt_1}{L - Vt}$

In a vessel underway and heading *away* from the waves, it is necessary to change the sign V in the foregoing equations.

Variation of Apparent Period of Waves With Changes in Speed and Course.

From these equations it will appear that the interval between the impulses from successive waves received by a vessel having way upon her and rolling freely, can only correspond with the true wave-period when the vessel's course is parallel to the direction of the wave crests, and that on all other headings the apparent period of the waves or the interval between the arrival of successive waves at the vessel and the consequent communication of successive impulses to her will vary from the true wave-period with both the speed and the course pursued; and thus it will at once be obvious how, in a vessel under control, seamanship may intervene, through a proper management of the vessel as to choice of speed and course, to prevent those destructive effects that are caused by the very deep rolling which may arise from the synchronizing of the apparent half-period of the waves with the vessel's natural period of rolling.

The apparent period of the waves that meet a vessel on a given course may readily be found. The observer takes his place in that part of the ship most convenient for his purpose, presumably on the bridge; and, having fixed upon a particular object on the vessel's side as a point of observation, he notes the instant of time of the arrival at this point of each successive wave of a series.

One-half of the mean of the intervals between the instants of time thus recorded equals the apparent half-period of the waves, and, if this is the same as the vessel's natural period of rolling, the correspondence may be changed by altering the vessel's course; or, if it is considered that this cannot be afforded, then by altering her speed.

If a vessel whose natural period of rolling is T seconds be steaming, among waves of a length l feet from crest to crest, at a speed of V* ft. per second on a course making an angle a with the direction in which the vessel would be end-on to the waves, then, in order that there may be a synchronizing effect of the

*V is marked plus if the movement is toward the direction from which the waves are coming, and minus if the movement is in the direction toward which the waves are running.

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waves upon the rolling of the vessel, the following relation must subsist:

$$V \cos a = \frac{l}{2T} \sqrt{5\,l}$$

How to Find the Undesirable Course With Any Given Speed.

Thus, if the waves be 320 ft. long and the vessel's natural period of rolling be five seconds, the right-hand member of the above equation will have a value of —8, and, therefore, V cos a must be equal to —8, so that

$$V = \frac{-8}{\cos a}$$

, and, if the heading of the vessel be such that $a = 60°$, then V, the vessel's speed, would have to be 16 ft. per second, or approximately 9 knots an hour toward the direction in which the waves are running; and it will be evident that a reduction or increase of as much as 50 per cent in the speed would obviate the synchronizing effect.

In this manner we may find the undesirable course with any given speed, and the undesirable speed with any given course, for a certain vessel among the waves of known dimensions.

In summing up, it may be said that, as far as the interests of ocean transportation have been subjected to loss on account of the excessive rolling of vessels at sea, these losses may be reduced or forestalled through the spreading among the mariners of a knowledge of the natural periods of rolling of the vessels which they are called upon to manage, through the ability on their part to recognize the apparent periods of the waves which they meet during oceanic voyages, and through an avoidance, by intelligent choice of speed and course, of those conditions which promote excessive rolling through a correspondence between the period of the vessel's roll and the half-period of the waves.

Vessels Lost During Quarter

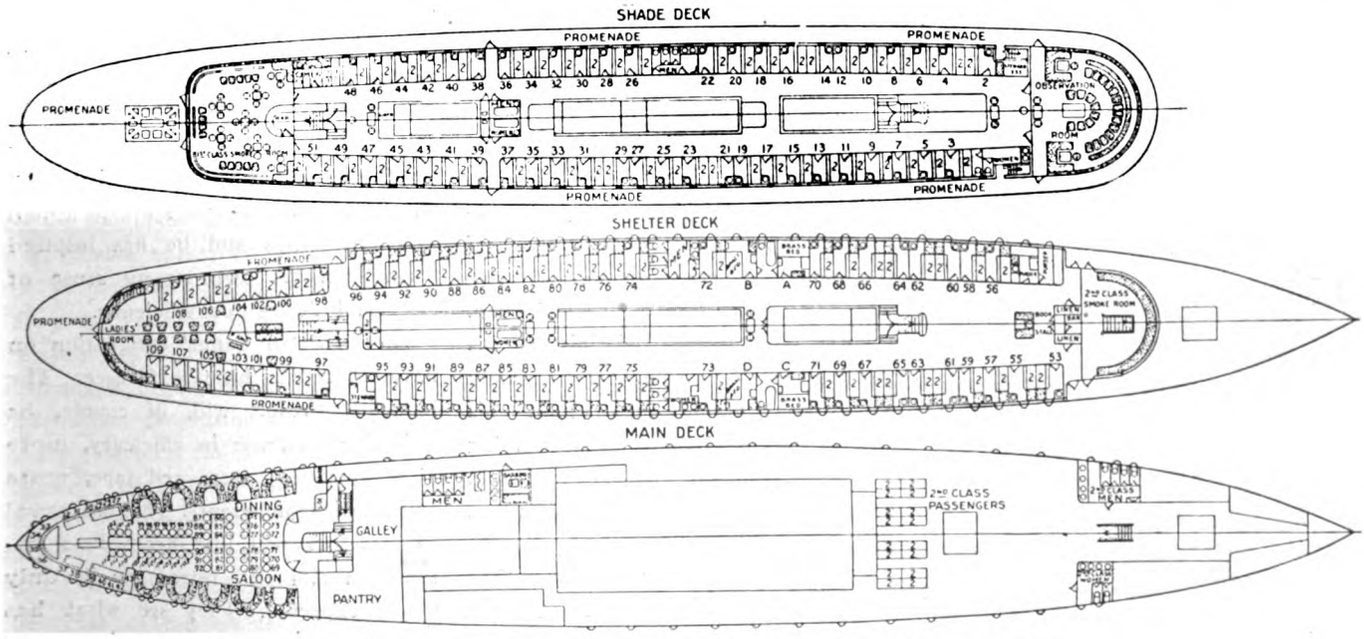
Lloyds Register has just issued the list of vessels lost and totally condemned for the period from Oct. 1 to Dec. 1, 1909. Including steam and sailing vessels, 210, of 180,967 gross tons, were lost. Of this number, 21 were abandoned at sea, eight broken up, nine burned, 23 foundered, 119 were wrecked, 11 are reported as missing and 17 were lost in collision. Of the total number lost, 84 were steamers of 103,511 gross tons. Of this casualty list, 57 were owned in the United Kingdom and colonies, 32 in Norway and 27 in the United States. Sweden lost 18, Russia 15, Germany 18 and France 14.

Revenue Cutter Perry Lost

The revenue cutter Perry struck Tonki point, off St. Paul island, one of the Pribyloff group, on which the largest sealing rookery in Alaska is situated, in a dense fog, July 30, and is a total loss. The officers and crew were taken off by the revenue cutters Tahoma and Manning. The Tahoma had a Japanese sealing schooner, seized for poaching, in tow when news of the wreck was received by wireless. The officers on the Tahoma and Manning ordered the abandonment of the Perry as a total loss. The Perry is one of the oldest revenue cutters in the service on the coast, and was one of the fleet of the United States revenue cutters engaged in the Bering sea patrol. The Perry was under orders to keep within the 3-mile limit close to the rookeries to prevent raiding by the Japanese sealers. She was built at Buffalo in 1884, was 161 ft. long, 25 ft. beam, with a displacement of 451 tons. She served on the great lakes until 1893, when she was taken to the coast.

Berry Bros. Convention

Berry Bros., Ltd., Detroit, held a convention of its managers and salesmen on July 6, 7 and 8. About 65 of the traveling force attended. The convention was presided over by James S. Stevenson, general manager. At the conclusion of the business meeting each day trips were made to nearby resorts. On Thursday afternoon the party left Berry Bros. dock on a special boat for a trip around Belle Isle and Peache island, proceeding to the Lighthouse Inn, where dinner was served, James C. Kelly, of New York, acting as toastmaster. On Friday the party went to Joe Bedore's famous hostelry at the St. Clair flats. This occasion was marked by the reading of an original poem by Charles H. Smith.



CABIN PLANS OF THE TWIN STEAMERS PRINCE RUPERT AND PRINCE GEORGE.

For description see page 302.

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THE MARINE REVIEW

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Resignation of Admiral Capps

The expected has happened. Rear Admiral Capps has resigned his position as chief constructor of the navy. When Admiral Capps gave his straightforward testimony before the house naval committee, exposing the glaring faults of naval administration, it was freely predicted in and out of congress that he would be punished for his truthfulness. While many of Capp's friends regretted his dictatorial qualities and impatience of suggestion, no one ever disputed his ability and his resignation is a distinct loss to the country; but it was inevitable that a man of such fiber should part company with such a man as Meyer, for nothing that has ever occurred in Meyer's life has fitted him for his present position. He meddles only to muddle.

Naval administration and naval clique cannot stand the light of truth. Capps could not be openly punished. Congress is jealous of its right to obtain information from witnesses called before the committees. Moreover, on account of his ability Capps has powerful friends in congress. So a safe and sure method of punishment was devised. Capps was hounded on all sides. The so-called aides to Secretary Meyer were given unlimited authority to interfere with his work, to balk him in every effort he made for improvement, and to make it impossible for him to successfully carry on his important work. This was pleasant work for the line clique, which has been for years endeavoring to gain supreme control of the bureau of construction and with whom he has been a marked man. Capps could not administer his department; he could not remain chief constructor and retain his self-respect, and there was nothing for him to do but resign. A twofold purpose was accomplished; Capps was punished for having dared to tell congress the truth, and at the same time he was gotten out of the navy to enable Mr. Meyer to appoint an inexperienced man as chief constructor, who will be unable to oppose Meyer and the line officers before the congressional committee next December.

THE MARINE REVIEW has made a very thorough investigation of the administration of the navy department and the navy yards and has been forced to record a disgraceful state of affairs. We have done this with regret and only in order to bring about a remedy In making this investigation we have become familiar with the work done by Admiral Capps and under his administration, and it is a pleasure to record this one bright spot in the clouds of naval misadministration. Many of the things for which the department has been most severely criticized were done in the face of his strenuous opposition.

Admiral Capps is recognized by all who know of his work as a man of great professional ability, great administrative ability, absolute honesty, and high purpose. He became chief constructor seven years ago, when but 39 years old, and is now in the very prime of life. At his age, and with his experience, he is now at his best to do great work for the navy and the country in reorganizing the navy department, yet on account of these very conditions he is driven out.

All reports that reach us from our representatives who have been investigating naval affairs are to the same effect, that everywhere they find that the only good results that are being obtained in the navy yards are those obtained by Capps' subordinates in spite of the tremendous obstacles imposed by the naval administration. These same constructors are to a man loyal to Capps and he has inspired them with his own strong sense of duty and desire for efficiency.

The result of Capps' resignation on naval officers is hard to foresee. The immediate result will, of course, be a further decrease in efficiency, more disorganization, more red tape, more control of incompetents. That the naval constructors will lose heart, lose enthusiasm and will retrograde is only to be expected. They see what has happened to the star of their corps; they know that if they attempt to ad-

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vance that they will meet with rebuffs; they know that if they make even minor successes that they will be marked for punishment. The temptation to do nothing—to drift—will be great, and, as a matter of fact, there is little else to do.

But will not this be temporary? Will not congress right the wrong? Will not congress at its next session go into naval administration and provide a permanent efficient organization for the navy department and the navy yards? We hope so. We believe that there are many men in congress who know the facts and who will be stirred to action by the punishment of Capps. If this is the result—if an efficient administration is obtained by these means, then the punishment of Capps will not have been in vain, and if we are right in our estimate of the man he will not complain if this result is obtained.

Surplus of Ships

As the July movement on the lakes was somewhat under that of June it would appear as though the June movement would be the record of the year. It is not expected that the August movement will equal that of July, as some of the owners carried a portion of their August ore during July. It therefore seems certain that there is no prospect of a return to active service during the balance of the present year of the ships which were put into ordinary over two months ago. This portion is practically one-fifth of the independent tonnage on the lakes and they make a rather pitiable spectacle lying in the outer harbors of the principal Lake Erie ports. They are likely to remain there until next spring. They present the strongest argument that could be advanced that the business of building bulk freighters on the lakes has been overdone. Of course, the cry has gone out for years that the business was being overdone, but there seemed little truth in it—until now.

The gist of the whole subject is that there has been a speculative element in ship building on the lakes during the past five years. The growth in tonnage has not been altogether legitimate, though the way trade expanded for a time to assimilate it would indicate so. The trade, however, growing magnificently, could not absorb the new tonnage as fast as it was built. Naturally the ship built as a speculative venture has been the first to feel the effects of over-supply. They will have difficulty in finding employment now until the excess tonnage is well digested.

Since 1904 an astonishing number of bulk freighters have been built and the readiness with which they all found profitable employment naturally attracted the promoter who is always anxious to help a good thing along. Ships were built that probably would not have been built normally. It has required such a season as this, when the volume of trade moving is the heaviest on record, to emphasize the fact beyond all argument that ship building has been overdone. There will be no more ships built by the promoter for the present. Anyone that goes about with a prospectus showing glittering profits will pour his tale into deaf ears. Ship building for some time to come will be confined to the iron ore producing, steel making companies, which can use them in their own business.

The fact is that the physical development of the various properties having to do with the transportation of ore have been very highly developed during the past few years. To begin with, practically all of the latter day ships are built with hatches spaced 12 ft. centers to conform to the pockets of the loading docks. It is possible to put a spout in every hatch and to load a ship with incredible rapidity. Over 10,000 tons of ore were placed in the Corey last fall in 30 minutes. The unloading machines are also approximating loading speed. It isn't any trick at all nowadays to discharge a 10,000-ton steamer in five or six hours. They do it every day and think nothing of it. For many years Conneaut, with its combination of Huletts and Browns, led in dispatch, but there are batteries of the same type now at other ports that are equal and better. There is scarcely a port on Lake Erie at which a 10,000-ton steamer cannot be unloaded in a working day of ten hours. Moreover, the machines never rest, they are going day and night, the vessel spending very little time in port. A round trip in seven days is getting to be the customary thing. Obviously this has increased the potential tonnage of each steamer and has thus contributed to a surplus of ships.

During 1909, 42,500,000 tons of ore were moved. To Aug. 1 of the present year 21,863,549 tons were moved, which is an increase of 6,468,199 tons over the corresponding period last year. This movement has been accomplished with one-fifth of the independent tonnage laid up. Approximately 50,000,000 tons will be moved this year with 20 per cent of the tonnage out of commission. Obviously the business has got to exceed the 50,000,000-ton limit before profitable employment can be found for the ships now in ordinary. It is, therefore, clear that there are too many ships.

Of course, the set-back is only temporary. It won't be long before the trade will absorb them. Meanwhile the ship yards, while fairly up with their construction program, are assured of abundant repair work.

Need of Better Communication

During the course of the year the Lake Carriers' Association spends large sums of money in private aids to navigation. It does not wait, by any means, for the government to take the initiative. It would seem as though the association might with advantage turn its attention to improving the means of communication to the more remote districts traversed by vessels. The case of the Zenith City is an illustration of the necessity for more adequate service. This steamer stranded on the rocks off Point Au Sable about 4 o'clock July 27. A boat was immediately dispatched to the fog signal station about a mile away only to discover there

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were no means of communication with the life saving station at Grand Marais, ten miles away. The trip to Grand Marais was slow and tedious. Upon arriving there it was discovered that there were no telegraphic communications whatever and that the only telephone to Seney, 40 miles away, at which point the nearest telegraph office was located, was owned by the Manistique railroad. The Manistique railway runs one or two trains a day and shuts up shop at Seney when the last one is run, which apparently is about five o'clock in the afternoon. After that hour there is no possible way of getting information out of Grand Marais until eight or nine o'clock the next morning.

The result was that the Zenith City was on the rocks about 17 hours before the home office received any word concerning her predicament. It is not necessary to emphasize the extreme danger of the situation. Fortunately there was no wind and the steamer suffered no damage from the sea; but had a northwest gale been prevailing she would have pounded to pieces before any help could reach her.

It would seem as though some sort of inter-communication should obtain between light-houses, life saving stations and the outer world. The cost of installing such service would not be costly and it certainly would be an invaluable aid to navigation.

Salving the Yucatan

Editor MARINE REVIEW:—We notice in your July number an article entitled "Salving the Yucatan". In this article you publish the bids for repairing this vessel and a comparison makes it appear that our bid was extremely low and out of proportion to other bids.

In the publishing of the bids it should have been stated that our bid had certain conditions attached to it which made it impossible to compare it with the other bids, as the other bidders bid on the specifications without reservation, and we stated in our bid that "we contemplated doing only that work which was traceable to the wrecking of the ship."

It was well known that before the Yucatan was wrecked, a large amount of repair work had been decided upon as necessary in order that the ship would be in serviceable condition and pass inspection. The wording of the specifications was a little ambiguous and this repair work was apparently included with the other work. In order to avoid any misunderstanding we inserted the clause stated above.

We have not as yet been awarded the contract for the repairing of the Yucatan, and it is quite certain we will not be until it is definitely determined who is to pay for the extra work.

We hope you will insert something in the next issue of THE MARINE REVIEW, which will correct the impression which your article conveyed that our bid was so extremely out of proportion to the other bidders.

Yours very truly,
WILLAMETTE IRON & STEEL WORKS.
Portland, Ore., July 23.

Upper Mississippi River Improvement Association

THE ninth annual convention of the Upper Mississippi River Improvement Association was held at St. Paul, Minn., July 12-14. The convention, which was attended by engineers, merchants, bankers and others interested, adopted a number of strong resolutions, the substance of which is as follows:

First—That the use of the Mississippi river for carriage of freight commensurate with the future needs of production and exchange requires a 6-ft. channel from St. Paul to St. Louis; ample terminals, adequate facilities for handling freight and craft which will insure satisfactory freight service.

Second—That it is the duty of municipalities along the river to see that such terminals and landings are provided.

Third—That it is the duty of Mississippi valley shippers to encourage the construction of modern craft and to use the river route, if possible, no matter how small the cargo.

Fourth—That five citizens be appointed at each principal shipping point along the upper river to further the work of the association in its efforts to have the river improved for navigation.

Fifth—That an educational campaign be inaugurated at once to include meetings at principal shipping points along the river and a general propaganda through the press.

Sixth—That the reservoir system of the upper Mississippi be indorsed and that reservoirs at the headwaters of all our rivers be advocated as a means of developing inland waterways.

Seventh—That St. Paul's policy of local harbor improvement be commended and that in the construction of an enlarged harbor and a new depot lie splendid opportunities for co-operation between water and rail to the advantage of the entire northwest.

Particular stress was laid upon the necessity of constructing and operating river boats of suitable modern design to take care of traffic already existing and to commence now to enlarge this traffic. Considerable emphasis also was given to a resolution introduced by A. F. Perry, of Quincy, Ill., urging that more attention be given to harbors and port facilities in order that the 6-ft. channel, for which Congress has made provision, may be fully utilized.

Thomas Wilkinson, of Burlington, Ia., was unanimously re-elected president. Other officers were elected as follows: Treasurer, John P. Eckart, Guttenberg, Iowa; secretary, Lewis B. Boswell, Quincy, Ill. Vice presidents: Illinois, William A. Meese, Moline; Missouri, John I. Martin, St. Louis; Iowa, L. A. Hammill, Keokuk; Minnesota, J. C. Armson, Stillwater; Wisconsin, Wm. A. Anderson, La Crosse.

The next convention will be held at Alton, Ill.

Between Minneapolis and St. Paul, instead of two dams, as originally planned, a high dam with a lift of 30 ft., provided with suitable locks, will be built. This will give a depth of 9 ft. to the Washington avenue bridge, Minneapolis, and will provide 15,000 h. p. when the hydro-electric development at the dam is completed.

Satisfactory progress was reported on the work on the dam and lock at the foot of Des Moines rapids, near Keokuk, Iowa. This dam will be 4,400 ft. long, 43 ft. wide at the bottom and 37 ft. high. The water power created will develop 200,000 h. p., a part of which will be immediately improved. A lock 95 ft. wide and 400 ft. long will be built. This is the largest engineer work of like nature now in progress within the borders of the United States.

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Argentine and American Battleship Designs

(From *The Navy.*)

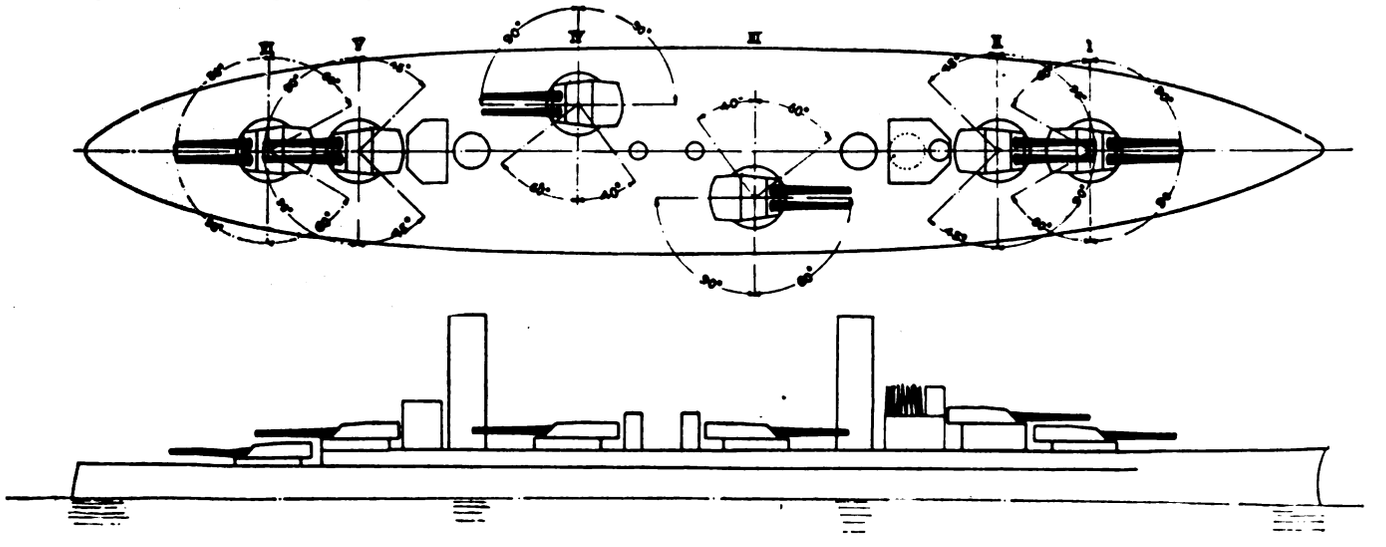
HEREWITH is given a comparison of the principal characteristics of the latest Argentine battleship with those of the Arkansas class of United States battleships.

It is noted particularly that while the displacement of these Argentine battleships is greater than the American with 23 ft. more length and something over 4 ft. greater beam, the mean draught of the Argentine vessels is 1 ft. less than than that of the American. Careful attention is invited to the difference of 2 knots in speed and to the fact that the Argentine designs call for a bunker capacity of 4,000 tons, as against 2,000 tons for the American, with a similar disparity in oil fuel stowage, namely, 660 tons as compared with 400; in other words, the Argentine ships carry 60 per cent more coal and 65 per cent more oil fuel than the American.

Just what, if anything, is sacrificed in the Argentine designs to get 39,500 horsepower as against the American 28,000 does not appear. It is certain that the secondary battery of the Argentine vessels outclasses that of the American, while their main batteries are identical. In fuel and ammunition endurance, the Argentine ships undoubtedly show a permissible maximum under the limiting conditions; and, even if it be assumed that the protection of the American vessels is on a par with the Argentine (which is open to question) it is patent that the Argentine designs—on the whole—are greatly superior to those of the latest vessels building for the United States navy. Why should this be so? The final cost of the two types will evidently be greatly in favor of the

COMPARISON OF ARGENTINE AND AMERICAN BATTLESHIP DESIGNS.

ITEM.	ARGENTINE BATTLESHIPS.	AMERICAN BATTLESHIPS. (Arkansas Class.)
Length over all	585 ft.	562 ft.
Breadth on load water line	98 ft.	93 ft. 2½ in.
Mean draught, trial displacement	27 ft. 6 in.	28 ft. 6 in.
Displacement, normal	27,500 tons.	26,000 tons.
Displacement, full load	30,200 tons.	27,243 tons.
Speed on trial, estimated	22½ knots	20½ knots.
Engines, type of	3-screw Curtis turbines.	4-screw Parsons turbines.
I. H. P., propelling machinery and auxiliaries thereof	39,500.	28,000.
Boilers, type of	"Babcock and Wilcox."	Water tube.
Coal bunker capacity, estimated	4,000 tons.	2,500 tons.
Fuel oil, carried in double bottoms	660 tons.	400 tons.
Main battery	Twelve 12-in. 50 cal. B. L. R.	Twelve 12-in. 50 cal. B. L. R.
Secondary battery	Twelve 6-in. R. F. G. Twelve 4-in. R. F. G. Field and saluting guns.	Twenty-one 5-in. R. F. G. Four 3 pdr. saluting. Two 1 pdr. boat. Two 3-in. field. Two 30 cal. machine.
Torpedo tubes	Two 21-in. submerged.	Two 21-in. submerged.
Conning towers	Two: One forward and one aft.	One forward.
Fire control positions	Five: One on the single mast, one above each conning tower, one in each of two independent armored towers.	Two: One on each mast, which are called "Fire Control Towers."
Funnels, number	Two: Widely separated.	Two.
Complement	Not known.	85 officers, 1,030 men.
Contract price	£2,190,000 ($10,665,300), fully equipped for delivery.	Hull and machinery only: Wyoming, $4,450,000; Arkansas, $4,675,000. Total cost (ready for sea), estimated, $11,500,000.
To be completed in	24 months, Fore River. 27 months, N. Y. S. B. Co.	32 months.
Armor, details	Main belt: 12-in., 10-in., 6-in. 4-in. Intermediate belt: 9-in., 8-in. Casemate: 6 in. Uptakes: 1½ in. Underwater: 600 tons N. S. disposition not given. Width of main belt: 8½ ft. Protective decks (two): Upper 1½ in.; lower 3 in. Turrets: 12 in. front. 9 in. sides. 11 in. back. 3 in. top. Conning towers: Forward, 12 in After, 9 in. Barbettes: 9 in.	Thickness and distribution, not known, but believed to be approximately as heavy and efficient as for the Argentine ships, with possible exception of bottom (anti-torpedo) protection. Doubtless the armor scheme of these U. S. vessels will closely resemble that of the Delaware and Florida classes.
Freeboard	Forecastle, 25½ ft. Amidships, 22⅔ ft. Astern, 17 1/12 ft.	Forecastle, 24 ft. estimated. Amidships, 21 ft. estimated. Astern, 18 ft. estimated.
Height of axis of turret guns (above mean load water line)	Turret No. 1, 31⅔ ft. Turret No. 2, 39⅔ ft. Turret No. 3, 31⅔ ft. Turret No. 4, 31⅔ ft. Turret No. 5, 31⅔ ft. Turret No. 6, 22 8/12 ft.	Turret No. 1, 30 ft. estimated. Turret No. 2, 37 ft. estimated. Turret No. 3, 34 ft. estimated. Turret No. 4, 27 ft. estimated. Turret No. 5, 32 ft. estimated. Turret No. 6, 25 ft. estimated.



LATEST ARGENTINE BATTLESHIP—ARRANGEMENT AND ARCS OF TRAIN OF MAIN BATTERY.

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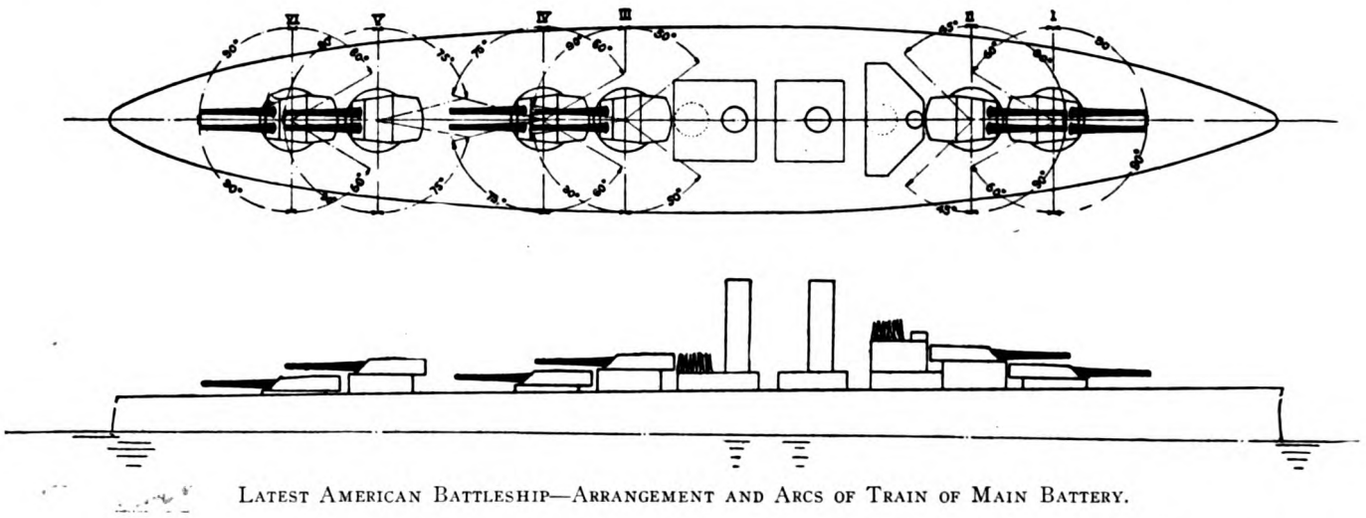
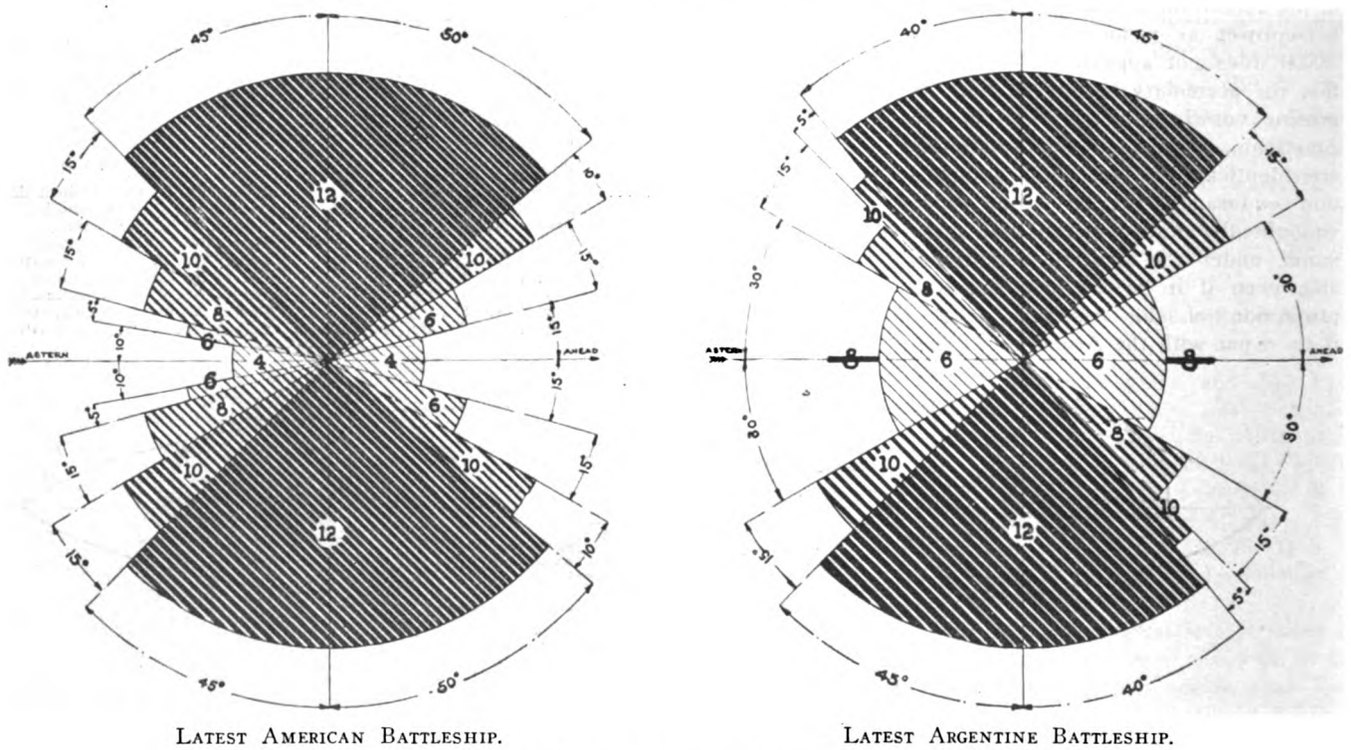
Argentine design; and it is to be observed, also, that contract time for completion of the foreign vessels is from five to six months less than for the American. These last two vitally important questions are deserving of the most careful consideration. It is likewise manifest that the American naval designers have been heavily scored against—by one of their former number—in the matter of main battery arrangement to secure greatest possible all around volume of fire, as shown in the sketch, where the to guns of No. 2 and No. 5 turrets of the Argentine ships is taken into account, the all-around density of fire is even more conclusively in favor of that design than the sketch is made to show.



LATEST AMERICAN BATTLESHIP—ARRANGEMENT AND ARCS OF TRAIN OF MAIN BATTERY.

The Big Canadian Dock Scheme

Sir Montague Allan, vice chairman of the Allan Royal Mail Line, who sailed from Liverpool, on June 17, by the Canadian Pacific Railway Co.'s steamer Empress of Britain, observed that during his short stay in England he had been able to advance materially the financial and other arrangements in connection with the great new graving dock, 1,000 ft. long, at Port Levis on the St. Lawrence. Sir Montague stated that the necessity for a new dock, capable of receiving the largest war or merchant ships afloat or at present contemplated, was becoming more apparent each day, the present accommodation being altogether unsuitable in view of the splendid developments which have taken place in the Canadian shipping trade. The shipping trade of the St. Lawrence was rapidly increasing, and he stated it was anomalous that large steamers should be compelled to go to Halifax or New York, or be sent to England for docking purposes.



LATEST AMERICAN BATTLESHIP. LATEST ARGENTINE BATTLESHIP.

Density of fire over all arcs of train, from main batteries of latest American and Argentine battleships.

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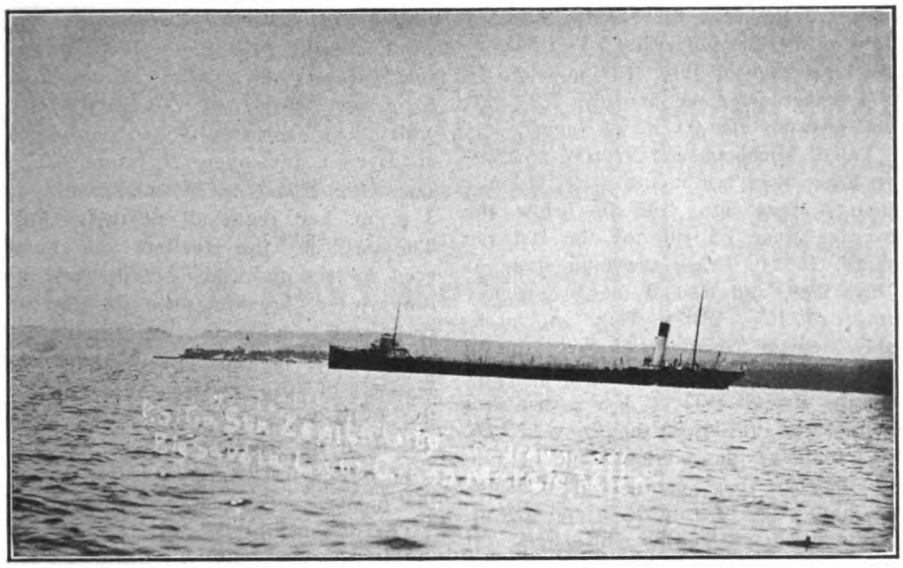
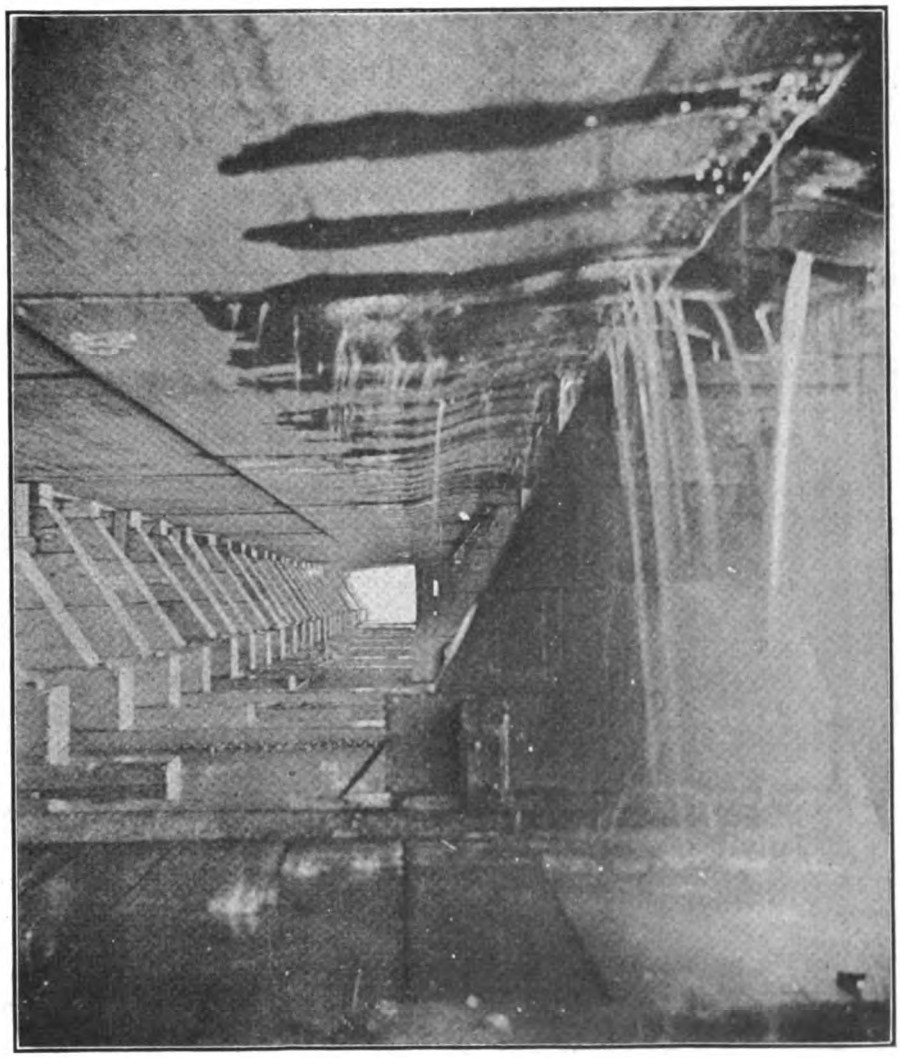


ZENITH CITY ON ROCKS OFF POINT AU SABLE, LAKE SUPERIOR.

Stranding of Zenith City

THE steamer Zenith City, of the Pittsburg Steamship Co.'s fleet, bound down with ore, ran on the rocks off Point Au Sable, Lake Superior, about 4 o'clock on the afternoon of July 27, during a fog. The accident was an extremely unfortunate one in that had the steamer passed 50 ft. to port she would have avoided the obstruction altogether. As it was, she went on hard for two-thirds of her length, giving her a pronounced list to starboard and quite a hump amidships. As she tore over the rocks, her spar deck described the undulations of a wave. Her starboard tanks leaked freely. The tug S. C. Schenck and lighter Reliance were sent to her relief, but did not reach her until 26 hours had passed, owing to lack of telephone and telegraph connections. Fortunately the weather continued favorable and the vessel suffered no additional injuries from the elements. She was released at one p. m., July 30, and taken to the Sault after part of her cargo had been lightered. She then transferred a further portion to the Maritana at the Sault and then proceeded to Cleveland, where the balance of her cargo was unloaded. She then went into dry dock at Toledo. A survey revealed the fact that her starboard side is in bad shape. About 60 plates are broken and will have to be replaced. Many frames will have to come out and the repairs will amount to a virtual rebuild of the starboard side. In addition some of the plates on the port side will have to be replaced. The damage extends pretty well the whole length of the ship. For a length of 30 ft. amidships the rivets are sheared off as though cut with a knife. There is also a vicious dent directly under the engines, but this was probably received in pulling her off. The Zenith City will be in dry dock about a month and the cost of repairing her may reach $60,000.



ZENITH CITY IN DRY DOCK AT TOLEDO. STARBOARD SIDE OF WATER BOTTOM, LOOKING FORWARD, SHOWING FRACTURES THROUGH WHICH WATER IS POURING.

July Ore Shipments

The ore movement during July was surprising, reaching a total of 6,945,289 tons, an increase of 252,264 tons over July, 1909, and coming within 371,303 tons of equalling the June record of the present year. The fleet has moved 21,863,549 tons up to Aug. 1, an increase of 6,468,199 tons over the corresponding period last year. In measuring this movement it must be understood that 20 per cent of the independent tonnage has been voluntarily laid up. It does not appear to have had any sensible effect on the trade, however, as the withdrawal has not been missed. The

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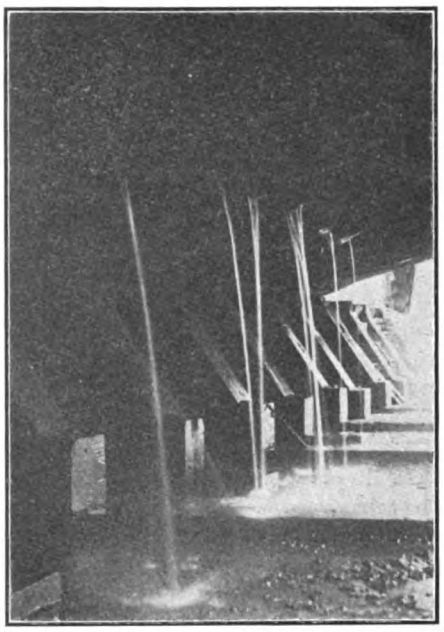


ZENITH CITY IN DRY DOCK. PORT SIDE OF WATER BOTTOM, LOOKING AFT.

fleet accomplished the movement with ease and could readily have moved more. Wild cargoes of course are scarce. Following is the summary of shipments:

Port.	July, 1909.	July, 1910.
Escanaba	884,271	725,123
Marquette	450,736	573,632
Ashland	449,163	718,309
Superior	1,111,533	1,262,468
Duluth	2 249,410	2,344,226
Two Harbors	1,547,912	1,321,531
Total	6,693,025	6,945,289
1910 increase		252,264

Port.	To Aug. 1, 1909.	To Aug. 1, 1910.
Escanaba	2,016,505	2,464,859
Marquette	870,961	1,723,877
Ashland	1,061,187	2,233,864
Superior	2,576,110	3,895,303
Duluth	5,434,135	7,441,488
Two Harbors	3,436,452	4,104,158
Total	15,395,350	21,863,549
1910 increase		6,468,199

Receipts at Lake Erie docks during July were as follows:

Port.	Gross tons.
Buffalo	710,511
Cleveland	1,005,263
Conneaut	1,041,330
Erie	151,210
Ashtabula	1,532,232
Fairport	276,382
Lorain	430,100
Huron	45,073
Sandusky	.....
Toledo	167,196
Detroit	20,159
Total	5,379,456

July Lake Levels

The United States Lake Survey reports the stages of the Great Lakes for the month of July, 1910, as follows:

Lakes.	Feet above tide-water, New York.
Superior	601.89
Michigan-Huron	580.50
Erie	572.35
Ontario	246.29

Lake Superior is 0.03 ft. higher than last month, 0.29 ft. lower than a year ago, 0.92 ft. below the average stage of July of the last ten years, 1.30 ft. below the high stage of July, 1899, and 0.13 ft. above the low stage of July, 1892. It will probably rise 0.1 ft. in August.

Lakes Michigan and Huron are 0.06 ft. lower than last month, 0.59 ft. lower than a year ago, 0.72 ft. below the average stage of July of the last ten years, 2.93 ft. below the high stage of July, 1886, and 0.60 ft. above the low stage of July, 1896. They will probably remain about stationary during August.

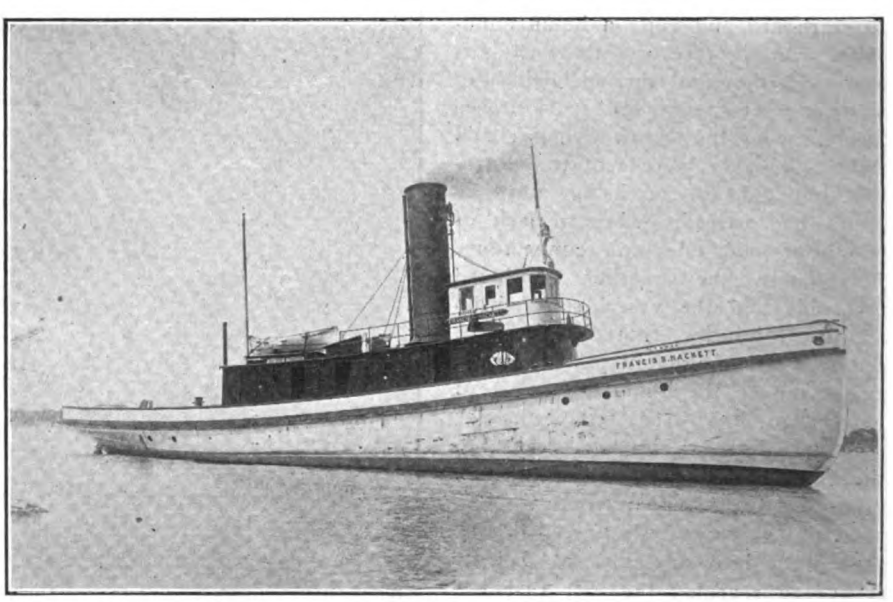
Lake Erie is 0.33 ft. lower than last month, 0.65 ft. lower than a year ago, 0.52 ft. below the average stage of July of the past ten years, 1.81 ft. below the high stage of July, 1883, and 0.89 ft. above the low stage of July, 1895. It will probably fall 0.2 ft. during August.

Lake Ontario is 0.17 ft. lower than last month, 0.87 ft. lower than a year ago, 0.53 ft. lower than the average stage of July of the past ten years, 2.05 ft. below the high stage of July, 1908, and 1.70 ft. above the low stage of July, 1895. It will probably fall 0.2 ft. during August.

Tug Francis B. Hackett

The tug, Francis B. Hackett, built by Johnson Bros., Ferrysburg, Mich., for the Hackett Towing & Wrecking Co., of Amherstburg, has proved herself to be a satisfactory craft, especially in crushing ice in the Detroit river during the winter season. She was especially designed for this service, and has met all requirements in the most satisfactory manner, being one of the best ice-crushing tugs ever stationed on the Detroit river. After cutting 12 steamers through the ice from Detroit to the southeast shoal, the Hackett was sent, on Dec. 16 last, to relieve three of the car ferries which had been imprisoned in the ice at Detroit for over 24 hours. The Hackett arrived at 10 a. m. and at 3 p. m. had them all in their slips. The next day the Hackett was chartered by the railroads for the rest of the winter, breaking the ice in the river and keeping the car slips practically free, making possible the operation of the ferries on schedule time. In fact, it is stated that from the time the Hackett began working none of the ferries lost an hour during the most severe weather.

The dimensions of the Hackett are: Length over all, 108 ft.; beam. 25 ft.; depth, 15 ft. She has a bunker capacity of 130 tons.



TUG FRANCIS B. HACKETT.

Lake Ship Building

Capt. John Mitchell, manager of the Buffalo & Susquehanna Iron Co., closed contract with the American Ship Building Co. last month for a freighter to replace the steamer Frank H. Goodyear, which was sunk in collision with the steamer James B. Wood in Lake Huron early in the season. The Goodyear was owned by the Buffalo & Susquehanna Iron Co., which naturally desires to be self-contained as a shipping company. The new steamer will be 552 ft. over all, 532 ft. keel, 58 ft. beam and 31 ft. deep, having triple-expansion engines and Scotch boilers. She will come out next year.

The steamer Wm. C. Moreland,

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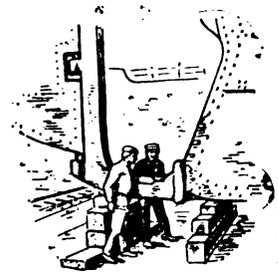

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building for the Jones & Laughlin Steel Co., Pittsburg, was launched from the Lorain yard of the American Ship Building Co. on July 27 and was christened by Miss Esther Moreland, niece of the man in whose honor the steamer was named. The Moreland is in the 600-ft. class and will be managed by W. H. Becker of Cleveland. This completes the program of new construction at the Lorain yard.

The package freighter Allegheny was launched from the Wyandotte yard of the American Ship Building Co., on July 9, for the Anchor line. She was christened by Miss Thayer, daughter of John B. Thayer, third vice president of the Pennsylvania railroad. The Allegheny is 372 ft. over all, 350 ft. keel, 46 ft. beam and 30 ft. deep.

Commerce of Sault Canal

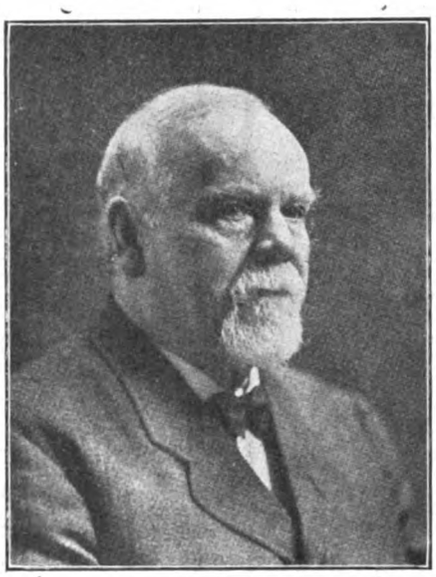
The July movement of freight through the canals at Sault Ste. Marie reached the total of 9,975,173 tons, the heaviest on record, the June movement being 9,839,872 tons. The movement to Aug. 1 of the present year has been 30,302,244 tons. Following is the summary:

	To Aug. 1, 1909,	To Aug. 1, 1910,
EAST BOUND.		
Copper, net tons.....	51,945	58,025
Grain, other than wheat, bushels	11,324,761	20,646,429
Building stone, net tons	980	1,877
Flour, barrels	2,393,394	2,959,177
Iron ore, net tons.....	14,540,764	21,096,934
Pig iron, net tons.....	11,374	13,785
Lumber, M. ft. B. M..	223,122	285,342
Wheat, bushels	23,088,460	27,729,066
Unclassified freight, tons.	70,522	68,084
Passengers, number ...	12,936	13,664
WEST BOUND.		
Coal, hard, net tons....	629,981	815,070
Coal, soft, net tons....	3,315,236	5,425,430
Flour, barrels	1,550	1,100
Grain, bushels	500	2,100
Manufactured iron, net tons	198,437	214,561
Iron ore, net tons.....	5,826	.....
Salt, barrels	364,142	324,704
Unclassified freight, tons	406,225	561,196
Passengers	13,858	16,406
SUMMARY OF TOTAL MOVEMENT.		
East bound, tons.....	16,213,999	23,237,769
West bound, tons.....	4,610,034	7,064,475
Total	20,824,033	30,302,244

Vessel passages to Aug. 1, 1910, were 9,957 and the net registered tonnage, 24,854,860

Obituary

Joseph Howard, manager of the DeLaney Forge & Iron Co., of Buffalo, died at his home on July 28. He was born, April 27, 1828, at Bury, Lancashire, England. He came to this country with his father and mother and the others of a large family when 14 years of age. The family settled in Fall River, Mass., and it was there at a blacksmith's forge that he laid the foundation of his practical knowledge in the working of iron and steel. His ability was so generally recognized by the forge trade in America that, when an organization of the trade was made a few years ago and needed as chairman of its executive committee a thoroughly practical forgeman, Mr. Howard was unanimously elected to this position, and he directed the practical workings of this organization for years.



JOSEPH HOWARD.

He went to Buffalo in 1868 to take an interest in the De Laney Forge & Iron Co. Since then he has continued actively to direct the practical workings of this institution.

Mr. Howard married Miss Grace Crighton on Dec. 20, 1849. From this union three sons were born, two of whom survive him, Albert J. Howard and David C. Howard. Mrs. Howard died, February, 1899; in July, 1899, Mr. Howard married Mrs. Caroline Crighton, a cousin of his first wife. She died on May 2, 1900.

Around the Great Lakes

E. G. Todt, formerly associated with the Manitowoc Dry Dock Co., at Manitowoc, Wis., has entered into business for himself at No. 9388 Ewing avenue, South Chicago, Ill., operating a general machine shop. The plant is near the Ninety-second street bridge, making it handy for marine repairs. The new enterprise is known as The E. G. Todt Co.

William Livingstone, president of the Lake Carriers' Association, is spending the summer in Europe.

During the month the ship yards have had some large repair jobs, notably the steamer John A. Donaldson, which struck in Little Rapids Cut, damaging 36 plates. She was repaired at Lorain. The L. C. Hanna, which went aground at Kettle Point, damaged 44 plates, and the Steinbrenner naturally required considerable rebuilding after her collision with the Berwind.

The owners of the wrecked steamer Henry Steinbrenner have reached an agreement with the underwriters and will take the steamer back. She was sunk in collision with the steamer Berwind in Mud Lake last fall and was abandoned as a constructive total loss. The underwriters paid the wrecking and repair bills and it is understood will allow the owners $20,000 demurrage. This is allowed on the understanding that the owners make no claim against the Berwind. The same underwriters were interested in both risks.

Col. C. McD. Townsend, government engineer with headquarters at Detroit, will make a survey of the Detroit river with a view of determining the cost of straightening the channel from Fighting island to a point where the Amherstburg and Livingstone channels converge. This is a stretch of 5 miles in which there are at present four turns. General Davis, who preceded Col. Townsend at Detroit, advocated the straightening of this channel just before his retirement, saying that the cost of doing so would be slight.

President Coulby, of the Pittsburg Steamship Co., has sold the wrecked steamer, J. B. Trevor, to F. S. Wiley, of Port Arthur, who, with Capt. Alex. McDougall, will endeavor to float her. The Trevor went ashore on Isle Royal, Oct. 13 last, and has been there since. Capt. W. W. Smith, marine superintendent for the Pittsburg Steamship Co., endeavored to salve the vessel last fall, but abandoned the attempt after being driven away by rough weather several times. The Trevor was built in 1895 at Superior, and is 308 ft. keel and 38 ft. beam.

In the description of the new lake steamer Thomas J. Drummond in our July issue we omitted to mention that this vessel was designed by Messrs. John Reid & Co. under instructions from J. E. McLurg, marine superintendent to the Algoma Central Steamship Line. The contract for the vessel was also placed through Messrs. John Reid & Co. and supervision of the hull and machinery during construction undertaken by their Glasgow office.

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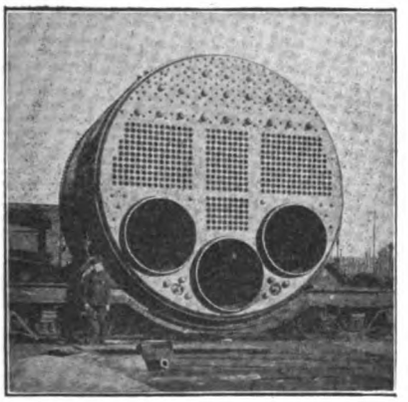

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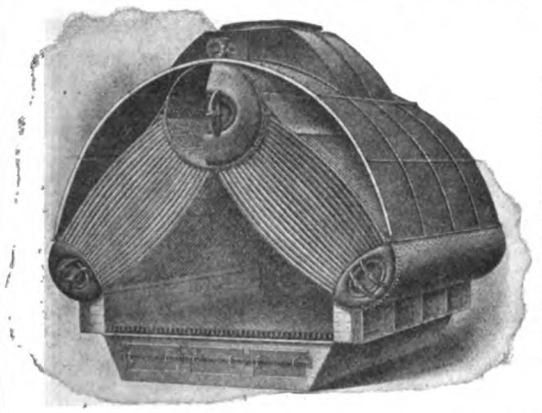

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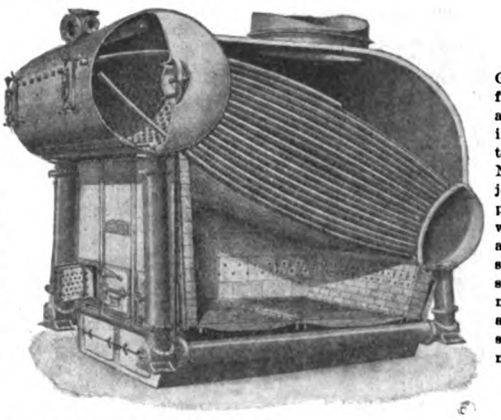

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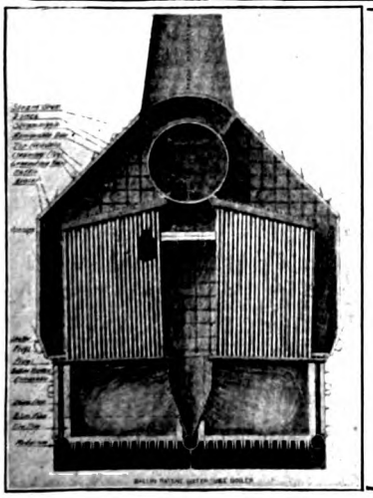

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ACCIDENTS TO LAKE VESSELS

ACCIDENTS to lake vessels during July were fairly numerous and some of them serious. In all, 34 accidents occurred, five of them being collisions. There were two total losses, the tug T. R. Wiehe, which was destroyed by fire near Escanaba, and the barge Grace Whitney, which was run down by the steamer Ogdensburg at Bar Point. The most costly accident was that of the steamer Zenith City, which stranded at Point Au Sable, Lake Superior, on July 27, smashing about 60 plates. A singular accident happened to the steamer Parks Foster, a large hole being blown through her bottom from an explosion of dynamite in the Chicago river. The machinery of the Eastern States became disabled, necessitating the withdrawal of the steamer from the Buffalo route and the substitution of the steamer City of Cleveland in her place. The new steamer attracted much attention at Buffalo and has proved so popular that she will be retained on the Buffalo run during the balance of the season. Meanwhile, the Eastern States is plying to Cleveland. The steamer D. G. Kerr ran on the rocks near the Limekiln during a dense fog on Aug. 3 and could not be released until about 1,200 tons of ore had been lightered. Her injuries, however, are not extensive.

An accident which is now undergoing the most rigid investigation is that of the steamer Lake Shore, which not only tore about 100 ft. of timber off the south pier walls, but ran the full length of the Poe lock and actually struck the upper gates, opening them a little. By this time, the steamer began backing and the pressure of the water mitered the gates perfectly so that no further damage resulted. The cause was doubtless a misunderstanding of signals between the bridge and engine room, but the case will doubtless be most thoroughly investigated, as accidents at the locks have been too frequent of late.

The parting of wheel chains bears its usual quota of accidents.

DATE.	NAME OF VESSEL.	NATURE OF ACCIDENT.	PLACE.
July 7	Str. D. O. Mills	Hit Kain block, in passing through bridge	Ashtabula.
July 7	Str. Parks Foster	Large hole blown in her bottom through mysterious explosion of dynamite; docked at Chicago	Chicago River.
July 8	Bge. Neil	Struck south lightship at Limekiln Crossing, tearing off her davits, most of her stanchions, and destroying the cabin	Detroit River.
July 8	Str. Wm. R. Linn	Ran aground at head of island; released on 9th, uninjured	Harsen's Island, Detroit River.
July 8	Str. Eastern States	Machinery disabled; high pressure cylinder, cylinder head and reverse gear broken; repaired at Detroit; completed repairs July 19	Lake Erie, off Buffalo.
July 9	Str. Maggie Marshall	Ran aground while light on shoal was out	Grant Island, Straits of Mackinac.
July 10	Str. Peter Reiss	Collided with str. Caledonia; not damaged	Detroit River.
July 10	Str. Caledonia	Collided with str. Peter Reiss; not injured	Detroit River.
July 11	Str. J. B. Cowle	One man drowned by falling off staging while painting side of boat	Off Conneaut, Lake Erie.
July 11	Str. J. A. McKee	Ran aground; released on 13th after lightering part of coal cargo	Colchester Reef.
	Str. Huron	Broke her wheel; repaired at Detroit	Lake Huron.
July 15	Str. Ontario	Grounded while entering harbor	Buffalo Harbor.
July 17	Str. Chas. Eddy	Threw bucket off her wheel; detained at Sault Ste. Marie, where diver replaced same	Lake Michigan.
July 18	Str. Iroquois	Disabled by breaking of rudder shortly after leaving Lorain; towed to Cleveland for repairs	Lake Erie.
July 19	Schr. Jane Ralston	Sprang a leak while moored at dock and sank	Sandusky.
July 19	Str. A. G. Brower	Ran aground	Southeast Shoal, Lake Erie.
July 19	Str. Bothnia	Sprang a leak and was beached ten miles above Ogdensburg	St. Lawrence River.
July 20	Str. G. A. Boeckling	Collided with str. A. Wehrle Jr.; slightly damaged	Sandusky.
July 20	Str. A. Wehrle Jr.	Collided with str. G. A. Boeckling; slightly damaged	Sandusky.
July 22	Str. T. R. Wiehe	Destroyed by fire	Portage Bay, near Escanaba.
July 24	Str. D. A. Gordon	Ran on rocks in storm; forepeak and No. 1 tank full of water; out 4 ft. forward; released July 26 after lightering 10,000 bu. of grain	Parisian Island, White Fish Bay.
July 25	Str. Alexis W. Thompson	Grounded, owing to low water; released on 26th after lightering; uninjured	Entrance to Green Bay Harbor.
July 26	Str. Rensselaer	Hit by a steamer; four plates damaged; repaired at Cleveland	Ashtabula.
July 27	Str. Shenango	Backed against west breakwater in shifting between docks and broke two buckets from her wheel	Ashtabula.
July 27	Str. I. W. Nichols	Wheel chains parted as she was leaving old river bed; hit dock and broke her quadrant	Cleveland, O.
July 27	Tug H. F. Bues	Tow line parted in storm from tug James Edwards, which towed her; believed to have sunk in 40 ft. of water; crew escaped	Near Pelee Island, Lake Erie.
July 27	Str. Zenith City	Ran ashore; out 2 ft. forward, and Nos. 1, 2 and 3 tanks on starboard side leaked; released July 30 after lightering 1,000 tons of ore; docked at Toledo for repairs on Aug. 4	Point Au Sable, Lake Superior.
July 29	Str. Lake Michigan	Struck by str. J. J. Barlum; slightly damaged	Cuyahoga River, Cleveland.
July 31	Bge. Grace Whitney	Run down by str. Ogdensburg and sank in 30 ft. of water; two lives lost	Bar Point, Detroit River.
July 31	Str. Tacoma	Picked up in disabled condition and taken to Cleveland, where repairs were completed Aug. 2	Lake Erie.
Aug. 2	Str. W. H. Mack	Ran aground; lightered 1,000 tons of coal, which she reloaded after being released	Mud Lake.
Aug. 2	Schr. Fannie Neil	Sprang a leak while loading coal	Cleveland Harbor.
Aug. 3	Str. Lake Shore	By misunderstanding of signals in engine room, str. ran into Poe lock at full speed; 100 ft. of timber torn off south pier walls, as well as coping of canal walls; narrow escape from very serious accident	Sault Canal.
Aug. 3	Str. D. G. Kerr	Ran on rocks in fog; leaked badly; released Aug. 4 after lightering 1,200 tons of ore, which she later reloaded in spite of leakage	Detroit River, near Livingstone Channel.
Aug. 4	Str. Arcadia	Derrick broke, killing captain of the vessel, John Whiteside	Port Arthur, Ont.

Brown Hoisting Machinery Company

The Brown Hoisting Machinery Co., of Cleveland, has just issued a catalog entitled "Modern Ore and Coal Handling Machinery." This catalog simply illustrates some of the more recent installations of Brown hoist machinery, which have come into service since the last catalog was issued. No effort has been made to give a detailed description of the machinery or to publish any data of results obtained, as this information is contained in other of the company's publications. The first few pages of the new catalog are devoted to photographs illustrating the earlier types of ore and coal handling machinery, as this company was the first in the United States to turn its attention to handling this class of material. The frontispiece is therefore a very fine photograph showing the old method of unloading ore by means of wheelbarrows. A photograph is also published of the three bridge tramways which were built by the Brown Co. for the New York, Lake Erie & West-

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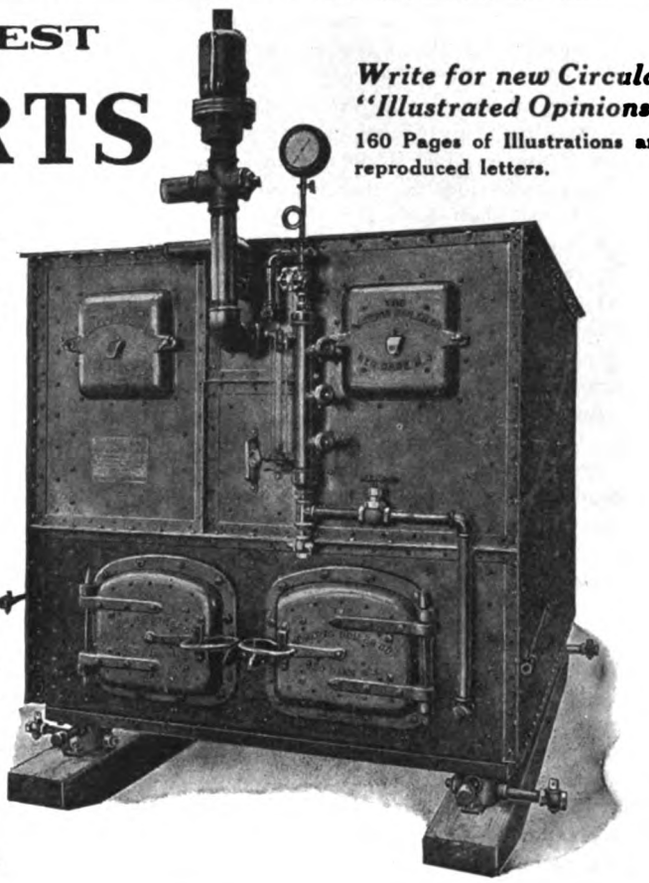

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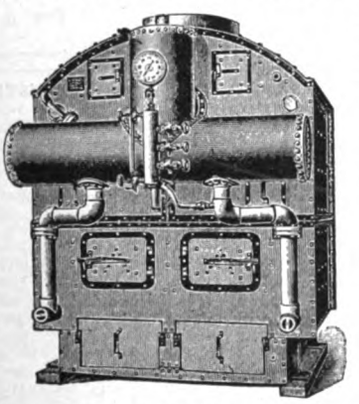

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ern Railroad in 1883. The next development were the bridge tramways with cantilevers for the Lake Shore Railway at Ashtabula in 1886.

Then came a simple cableway for handling ore, built for Carnegie Bros. & Co., of Bessemer, Pa., in 1887. An excellent reproduction is also given of the first fast plant built for M. A. Hanna & Co., of Cleveland, in 1890. The illustrations then follow chronologically the installations at various Lake Erie ports, together with tramways, conveying bridges, bins, pig iron breakers and cranes erected at various furnace plants throughout the country. The concluding illustrations are of more recent installations for rapid handling of material at numerous furnaces. All of the illustrations are reproduced in photo-gravure and the catalog is a splendid one throughout.

New Steamer Kulshan

The Kulshan, a new steel passenger steamer for the Puget Sound Navigation Co., was launched at the ship yards of the Moran Co., Seattle, on July 21. The Kulshan was described in THE MARINE REVIEW of May, 1910, under the name Comanche. She will be put on the run from Seattle to Bellingham about August first. Her name was changed from Comanche to Kulshan in deference to the wishes of the residents of Bellingham. The Kulshan was christened by Miss Irene Yarrow, of Bellingham, who was selected by popular vote of Whatcom county, after an exhaustive competition extending over several weeks. Miss Yarrow was supported by Miss Noyes and Miss Ketzler, of Anacordes, and Misses Fletcher, Andrews and Bonnevier, of Bellingham. When launched, the Kulshan was more nearly complete than any similar vessel launched on the Pacific coast, being about 90 per cent finished. Her boilers and machinery were all in place and ready for commission. The only work remaining to be done was in connection with the interior upholstering and decoration. The new steamer is 175 ft. long and her plans show a number of departures from the type of steamers usual on Puget Sound. The Puget Sound Navigation Co. has plans for several other vessels of similar type, to be built in the near future by The Moran Co. The Kulshan's keel was laid on April 14, 1910. The Kulshan is fitted for oil fuel, carries a crew of 32, and on her builders' trial, July 31, made over 14 knots per hour, the contract calling for 13½ knots.

Work on the construction of the new B. & O. ore docks at Lorain is progressing rapidly.

SUMMARY OF NAVAL CONSTRUCTION.

The monthly summary of naval construction, issued by the bureau of construction and repair, shows the following progress upon vessels:

Name of Vessel—	Building at—	—1910— Per Cent of Completion. June 1.	July 1.
BATTLESHIPS.			
Florida	Navy Yard, New York	66.3	68.8
Utah	New York S. B. Co.	76.0	80.0
Wyoming	Wm. Cramp & Sons	22.5	28.4
Arkansas	New York S. B. Co.	27.6	34.6
TORPEDO BOAT DESTROYERS.			
Paulding	Bath Iron Works	89.4	92.4
Drayton	Bath Iron Works	82.5	86.1
Roe	Newport News S. B. Co.	88.7	92.3
Terry	Newport News S. B. Co.	86.9	89.7
Perkins	Fore River S. B. Co.	79.6	86.8
Sterrett	Fore River S. B. Co.	77.1	83.8
McCall	New York S. B. Co.	76.5	85.4
Burrows	New York S. B. Co.	72.7	85.2
Warrington	Wm. Cramp & Sons	68.3	74.4
Mayrant	Wm. Cramp & Sons	73.9	79.1
Monaghan	Newport News S. B. Co.	19.9	26.7
Trippe	Bath Iron Works	38.8	49.9
Walke	Fore River S. B. Co.	32.1	39.1
Ammen	New York S. B. Co.	40.4	48.5
Patterson	Wm. Cramp & Sons	23.0	33.0
SUBMARINE TORPEDO BOATS.			
Salmon	Fore River S. B. Co.	94.7	97.4
Carp	Union Iron Works	53.5	58.6
Barracuda	Union Iron Works	53.5	58.6
Pickerel	The Moran Co.	50.4	53.1
Skate	The Moran Co.	50.4	53.1
Skipjack	Fore River S. B. Co.	40.1	45.3
Sturgeon	Fore River S. B. Co.	38.9	43.7
Thrasher	Wm. Cramp & Sons	5.7	6.4
Tuna	Newport News S. B. Co.	26.2	28.3
Seal	Newport News S. B. Co.	50.1	51.2
COLLIERS.			
Cyclops	Wm. Cramp & Sons	74.8	79.3
No. 8	Maryland Steel Co.	28.2	34.9

Pacific Coast Notes

The Balcom Steamship line is the latest to enter the Northern British Columbia trade between Victoria and Stewart. At present, the company has only one steamer, the J. L. Card, under charter, but expects to have several more operating soon.

A public dock for commercial purposes is being built at Vancouver, Wash., by the Pittock & Leadbetter Lumber Co., of Vancouver. The dock is 150 x 200 ft., and is located just above the steel bridge across the Columbia river.

The Grand Trunk Pacific Steamship Co. has established a bi-weekly service between Seattle and Stewart, calling at Victoria, Vancouver, and Prince Rupert. The Prince George, a sister ship of the Prince Rupert, began her schedule on July 21. Prince Rupert leaves Seattle every Sunday and Prince George every Thursday evening for the northern ports.

J. H. Rosseter, Pacific Coast manager for W. R. Grace & Co., has announced that four new steamers will be constructed by the Grace company for service between Puget Sound and British Columbia and south Pacific coast ports. The plans for the new steamers call for vessels 410 ft. in length, 52 ft. beam, and 22 ft. 6 in. draught, and an average speed of 12 knots, with a dead weight carrying capacity of 7,600 tons. Accommodations will be provided for a number of first class passengers.

PROPOSALS FOR CONSTRUCTING Breakwater:—U. S. Engineer Office, 813 Prospect Ave., S. E., Cleveland, O., July 25, 1910. Sealed proposals for constructing Breakwater at Conneaut Harbor, O., will be received at this office until 10 o'clock, A. M., August 25, 1910, and then publicly opened. Information on application, John Millis, Col., Engrs.

PROPOSALS FOR EXTENDING BREAKwater:—U. S. Engineer Office, 813 Prospect Ave., S. E., Cleveland, O., August 2, 1910. Sealed proposals for Extending Outer Breakwater towards shore, Lorain Harbor, O., will be received at this office until 10 o'clock, A. M., September 2, 1910, and then publicly opened. Information on application. John Millis, Col., Engrs.

PROPOSALS FOR DREDGING:—U. S. Engineer Office, 813 Prospect Ave., S. E., Cleveland, O., July 25, 1910. Sealed proposals for dredging Conneaut Harbor, O., will be received at this office until 10 o'clock, A. M., August 25, 1910, and then publicly opened. Information on application. John Millis, Col., Engrs.

U. S. ENGINEER OFFICE, JONES BUILDing, Detroit, Mich., July 30, 1910. Sealed proposals for Canal construction, etc., at Sault Ste. Marie, Mich., will be received at this office until 3 P. M., August 30, 1910, and then publicly opened. Information on application. C. McD. Townsend, Col. Engrs.

PROPOSALS FOR DREDGING:—U. S. Engineer Office, 813 Prospect Ave., S. E., Cleveland, O., August 2, 1910. Sealed proposals for dredging Toledo Harbor, O., will be received at this office until 10 o'clock, A. M., September 2, 1910, and then publicly opened. Information on application, John Millis, Col., Engrs.

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